HIGHWAY PERFORMANCE MONITORING SYSTEM

Instructions for Updates

(Full List of Data Items)

Calfornia Department of Transportation
Division of Transportation System Information
Office of Highway Inventory and Performance

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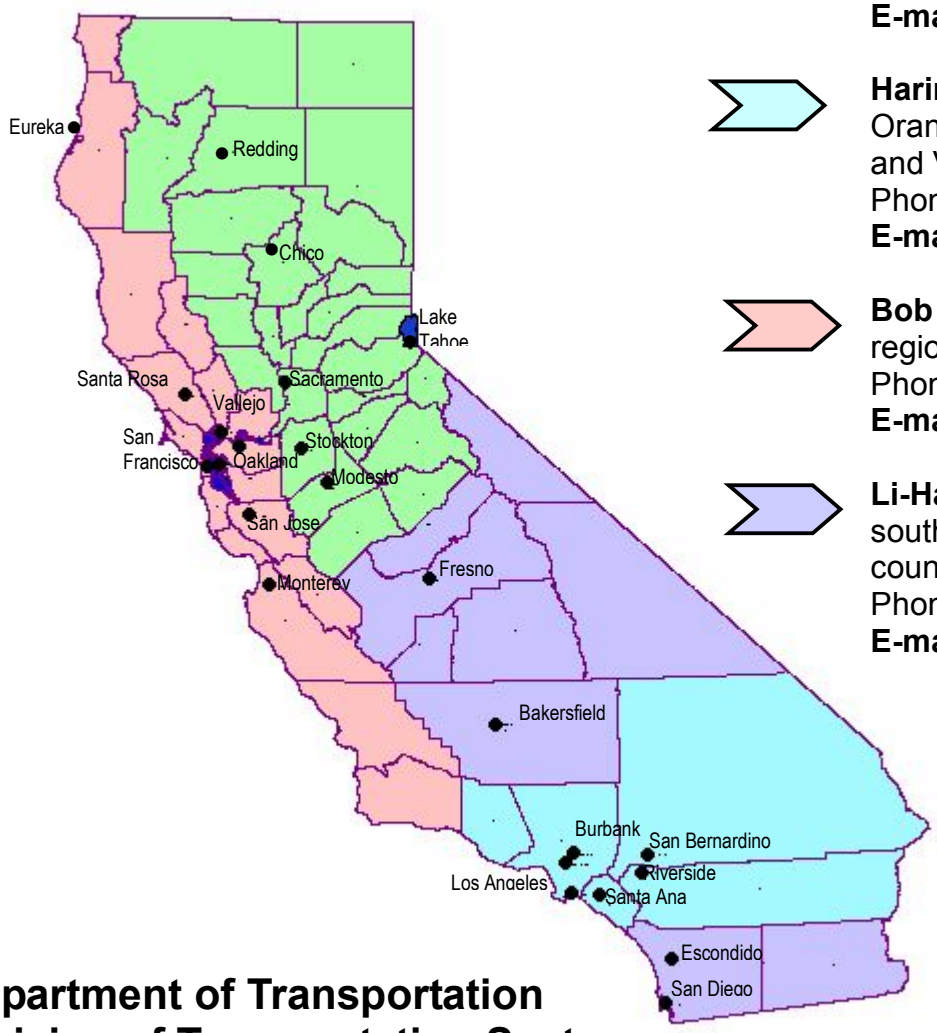

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The California Department of Transportation, Division of Transportation System Information, Highway Performance Branch, in cooperation with the U.S. Department of Transportation, Federal Highway Administration, prepared this workbook. This booklet is prepared as a guide for reporting the federally mandated HPMS data. For more information on traffic counting procedures or other engineering functions, refer to the various manuals available, such as the FHWA HPMS Field Manual (http://www.fhwa.dot.gov/ohim/hpmsmanl/hpms.htm), the TRB 1994 Highway Capacity Manual (http://www.nationalacademies.org/trb), and the FHWA Traffic Monitoring Guide.
For our website, go to: http://www.dot.ca.gov/hq/tsip/TSIPHPMS

Regarding suggestions to enhance this manual and make it more useful to you, please contact Rose Cuellar at (916) 654-2632, E-mail: rose.cuellar@dot.ca.gov or fill out the highway data survey form on page A-13. All comments will be reviewed.

ABOUT THE HPMS PROGRAM

The Highway Performance Monitoring System (HPMS) is a federally mandated inventory system and planning study designed to assess the nation's highway system. Its authority is maintained through the following Codes of Federal Regulations: 23 CFR 420.105(b), 23 CFR 500.807(b), 40 CFR 51.452(b)(2), 40 CFR 93.130(b)(2), and EPA Section 187. HPMS is used as a management tool to determine the allocation of Federal Aid Funds, to assist in setting policies, and to forecast future transportation needs as it analyzes the system's length, condition and performance. Additionally, it is used to provide data to the Environmental Protection Agency (EPA) to assist in monitoring air quality conformity and its data are used in support of the Biennial Report to Congress on the Status of the Nation's Highways.

The HPMS database is not a static entity but a dynamically changing live database. New volume groups are recalculated each year as annual traffic figures change. This affects HPMS reports to the Federal Highway Administration (FHWA) on sample adequacy within each volume group. In order to maintain the database in a current and significant manner, we emphasize the need for updating all currently established sample records. FHWA requires information for Items 1 through 46 on all applicable records of the database and requires additional information for Items 47 through 98 on all applicable sampled segments. As a result of the Environmental Protection Agency's (EPA) guidelines, Vehicle Miles of Travel (VMT) will be closely monitored in non-attainment areas. The EPA has designated the HPMS database as the source for this information in Section 187. Because of the need for accuracy in these and other reports generated from the HPMS database, it is very important that accurate and complete data are reported. It is imperative that close attention is given to Item 33, AADT. For a detailed discussion of this item, see Appendix F on page A-9.

The California Department of Transportation, Division of Transportation System Information, Highway Performance Branch, has the responsibility of maintaining a database of over 45,000 records pertaining to all public road mileage in the HPMS database. The following types of records comprise the database:

Universe records are those records that contain a limited set of data. Specifically, universe records are populated with data in Items 1 through 46.

Sample records are records that are randomly selected from the universe records to form a statistically sound generalization of data for each affected volume group. The selection is based on FHWA established precision levels regarding the Annual Average Daily Traffic (AADT) Volume Group and the Functional System. The sample record includes all data items within the database.

Donut area sample records are those records used to enhance the precision level of travel estimates outside the urbanized areas, but within EPA designated non-attainment areas. Specific functional systems involved within these non-attainment areas are rural Minor Arterial and Major Collector and small urban Minor Arterial and Collector.

Highway Performance Monitoring System
Data Items Listing

Data Items Listing

ITEM 1	**Year of Data Being Reported** The 4 character calendar year being reported.
ITEM 2	**State Code** The State Federal Information Processing Standards (FIPS) code for CA = 06
ITEM 3	**Data Reporting Units** **0 = English 1 = Metric** **Data is currently reported in English Units**
ITEM 4	**County Code** County Federal Information Processing Standards (FIPS) code. ***Appendix A on page A-3 lists codes for CA counties.***
ITEM 5	**Section Identification** If Item 9 = 0 (section Identifier), use XXYYYYZZZZZZ (12 characters only) If Item 9 = 1 (grouped record identifier), use XX0000TTTT00 (no character # limit) **Where: XX = Caltrans District** **YYYY = Route** **ZZZ.ZZZ = Postmile or Section Designation** **TTT.T = Countywide Unique Number**
ITEM 6	**Standard Sample Indicator** This field is set by HPMS Software. A "1" entered in this field designates that the record is a standard sample record. Otherwise the field is zero filled.
ITEM 7	**Donut Sample Indicator** This field is set by HPMS Software. A "1" entered in this field designates that the record is a donut sample record. Otherwise the field is zero filled.

ITEM 8 – STATE CONTROL FIELD

a	**Alpha County Abbreviation** ***(See Appendix A on page A-2 for a list of counties and their abbreviations.)***
b	**Jurisdiction (left justified)** **Should agree with Item 25 (Government ownership) if applicable.**
c	**Post Mile Limits or Street Name** **State Highway format:** **ANNN.NNN/ANNN.NNN** **(where A= alpha or blank and N = numeric)**
d	**"From" Location - beginning of the record or section.**
e	**"To" Location - ending of the record or section.**
f	**County Road System Map Number**
g	**Year of Field Review** **State Review = R** **FHWA Review = F** **(plus last 2 digits of review year - example: R00 / F00)** **New Reviews = RX** **(plus last digit of review year - example: RX0)** **Reclassification Codes:** **A = New section** **B= Functional System change** **C = Later new section** **C- Later Functional System change**
h	**HPMS Staff Use Flag** - "*" indicates section is flagged for one of the following: **SHWY** - manual update of AADT is required **LOCAL** - seasonal count station exists on section
i	**Vehicle Classification Location -** "V" designates that a vehicle classification location is within the section boundaries.
j	**Approach Width** (normally 1/2 of the paved width)
k	**Metropolitan Planning Organization (MPO) Code:**

A = AMBAG	**F = COFCG**	**M = MTC**
B = BCAG	**H = SCRTPA**	**N = SAAG**
C = SACOG	**J = SJCOG**	**R = SBCAG**
D = SANDAG	**K = KERNCOG**	**S = SCAG**
E = MCAG	**L = SLOCOG**	**T = TCAG**

l	**MPO Regional Code** (subdivision of MPO areas where applicable)
m	**Reporting Status of Section** **X = new sample** **N = jurisdiction did not report in previous year**
n	**Small Urban Code** ***(see Appendix C on pages A-5 for a list of small urban codes)***

ITEM 9	**Is Section Grouped?** This item is used by the software to indicate whether the data reported are for a single or for a group of sections. **0** = **Individual** section identifier **1** = **Grouped** section identifier
ITEM 10	**Linear Reference System (LRS) Identification** A Linear Reference System is required by FHWA for linking with the Federal Geographical Information System (GIS). This system will allow users to reference HPMS information to the map location of road sections. Code for all sections.
ITEM 11	**LRS Beginning Point** Milepoints or kilometerpoints at beginning of the segment. Code for all sections.
ITEM 12	**LRS Ending Point** Milepoints or kilometerpoints at ending of the segment. Code for all sections.
ITEM 13	**Rural / Urban Designation (population)** Code for all sections. (*For a more detailed explanation, see Functional Systems Appendices B and C on pages A-3 through A-6.)* 1 = Rural Area 2 = Small Urban Area (5,000 – 49,999) 3 = Urbanized Area (50,000 – 199,999) 4 = Large Urbanized Area (200,000 or more)
ITEM 14	**Urbanized Area Sampling Technique** Software to calculate expansion factors uses this item.
ITEM 15	**Urbanized Area Code** When the Rural/Urban code (Item 13, above) is coded “3” or “4”, enter the three-digit urbanized area code *(for official list see Appendix B, page A-3).* Code for all sections.
ITEM 16	**National Ambient Air Quality Standards (NAAQS) Non-attainment Area Code** This item permits analysis and mapping of information for EPA designated nonattainment areas. Enter the three-digit urbanized area code *(see Appendix D on page A-6 for a complete list)* for the dominant urbanized area in an air basin (includes rural and small urban sections within the non-attainment area). Otherwise field will be coded “0”. Code for all sections.

ITEM 17 Functional System (FS)

This item is coded to match FHWA approved maps. *For a more detailed description, see Appendix I beginning on page A-14.* Code for all sections.

Rural Functional System Codes		Urban Functional System Codes	
1	Principal Arterial Interstate (PAI)	11	Principal Arterial Interstate (PAI)
2	Other Principal Arterial (OPA)	12	Principal Arterial Other Fwys & Exp (OFE)
6	Minor Arterial (MA)	14	Other Principal Arterial (OPA)
7	Major Collector (MJC)	16	Minor Arterial (MA)
8	Minor Collector (MNC)	17	Collector (COL)
9	Local (LOC)	19	Local (LOC)

ITEM 18 Generated Functional System Code

This item is generated from Item 17 by HPMS Software to be used internally by the software. If Item 17 is changed, the standard calculations must be run to obtain the proper code here. Must be coded for all sections.

Code	RURAL	URBAN
1	Interstate (PAI)	Interstate (PAI)
2	Other Principal Arterial (OPA)	Other Fwys & Exp (OFE)
3	Minor Arterial (MA	Other Principal Arterial (OPA)
4	Major Collector (MJC)	Minor Arterial (MA)
5	Minor Collector (MNC)	Collector (COL)
6	Local (LOC)	Local (LOC)

ITEM 19 National Highway System (NHS)

A Federal-aid highway system initiated by ISTEA legislation and further outlined in the NHS Designation Act (NHSDA) of 1995. Due to an increased need for Intermodal Transportation analysis, the HPMS must identify NHS Intermodal connectors and distinguish the type of terminals they serve. If more than one connector type is involved, use the predominant type.

0	Section is NOT on the NHS.
1	Section IS on the NHS, but is NOT an Intermodal connector.
The following are types of NHS Intermodal Connectors:	
2	Major airport
3	Major port facility
4	Major Amtrak Station
5	Major rail / truck terminal
6	Major intercity bus terminal
7	Major public transit terminal or multi-modal passenger terminal
8	Major pipeline terminal
9	Major ferry terminal

ITEM 20 **Constructed, Planned or Unconstructed Facility**

APPLIES TO NHS ONLY NO PAS

Denotes whether the reviewed section is on the National Highway System (NHS) and if the section is open to traffic. Defaults at 0.

0	Section IS NOT on the NHS.
1	Section IS on the NHS and IS OPEN to public travel.
2	Section IS on the NHS but IS NOT YET BUILT.

ITEM 21 **Official Interstate Route Number**

Required for all Interstate system data records. Use the officially approved AASHTO/FHWA Interstate route number. Enter a 5-character, right justified, alphanumeric value. If two or more Interstate routes occupy the same roadway, code the lowest route number. Non-interstate is zero filled.

ITEM 22 **Route Signing**

Indicates the type of signing that exists on the route. Does not include informational or directional signs. Report for PAS & NHS; reporting for other systems is optional. If the highway is unsigned, use code “0”. Most city and county streets will normally be coded “0”. County roads are usually signed with official county road signs. If a section is signed with two or more identifiers, code the highest class (or lowest code) of the route. Follow the hierarchy order below.

0	Not signed or not applicable	5	County
1	Interstate	6	Township (not used in CA)
2	US official road	7	City
3	Official State road	8	Parkway / forest route
4	Off Interstate (business marker)	9	None of the above

ITEM 23 **Route Signing Qualifier**

Specifies how the route marker in Item 22 actually is or will be signed. Code for all PAS, NHS and rural minor arterial system sections. Where more than one code is applicable, use the lower numbered code. If the roadway is unsigned, use code “0”.

O = No qualifier/Not signed/not applicable	5 = Loop
1 = Alternate	6 = Proposed
2 = Business Route	7 = Temporary
3 = Bypass	8 = Truck Route
4 = Spur	9 = None of the Above

ITEM 24 **Signed Route Number**

Code for all PAS, NHS and rural Minor arterial system sections; reporting for other sections is optional. Enter an 8-character, right-justified, alphanumeric value for the signed route number shown on the marker described in Items 22 and 23. If Items 22 or 23 are coded "9", code other descriptive alpha-character prefixes or suffixes abbreviated to 8 characters, if available. If Item 22 = 0 and route signing is not required or available, field should be zero filled.

ITEM 25 Government Ownership

Identifies the owner of the facility and is used in cost-allocation studies, to track historic data and in the NHS database. Code the level of government that most accurately describes the highway owner, disregarding agency agreements for maintenance or other purposes. If more than one code applies, report the lower numbered code. Item 8b should correspond to this entry.

1	State Highway Agency	5	Other State Agencies
2	County Highway Agency	6	Other Local Agencies
3	Town or Township Highway Agency	7	Federal Agency
4	Municipal (City) Hwy Agency (LA, etc.)	8	Other

"County, Local, municipal, town or township" must be officially recognized governments established under State authority. "Other" designations may be owned by tribal Nations or non-governmental organizations with the authority to build, operate or maintain toll or free highway facilities.

ITEM 26 Special Systems (STRAHNET)

Identifies special funding for Strategic Highway Corridor Network (STRAHNET) facilities and is used by the Department of Defense to identify strategic deployment routes. Code whether or not a segment is on the STRAHNET system.

0	Not on a STRAHNET system or a STRAHNET connector.
1	Section is on a STRAHNET or segment is a STRAHNET connector. Code “1” for all Interstate System sections that are open to traffic.

ITEM 27 Type of Facility

This item is used to determine whether a segment is on a one- or two-way roadway or structure. It is used in investment requirements modeling to calculate capacity and estimate roadway deficiencies and improvement needs, in the cost allocation pavement model and in the NHS database. If codes 3 and 4 are used, section must be ENTIRELY on the structure. Codes 1 or 2 should be used when the segment is partially on a structure.

1 One-Way Roadway	3 One-Way Structure (Bridge, Tunnel, Causeway, etc.)
2 Two-Way Roadway	4 Two-Way Structure (Bridge, Tunnel, Causeway, etc.)

ITEM 28 Designated Truck Route

Designated truck routes are available to truck tractor and 48-foot semi-trailer combinations and truck tractor and 28-foot twin trailer combinations, both subject to no overall length limits. Also available to specialized combination vehicles such as automobile and boat transporters, maxicube vehicles, and saddle mount combinations, subject to Federal minimum overall length limits [generally 65 to 75 feet]. Width limits are up to 102 inches. Routes that simply provide access for these vehicles to terminals, rest or other services are NOT included. Routes that restrict any of the above types of trucks because of width or length limitations are NOT included. Truck routes are only designated on state or federal highways. Code for all segments.

0 = Not a designated truck route	1 = Designated truck route

ITEM 29 **Toll Facility**

The segment is to be considered a toll facility if a toll is charged on any portion of the roadway. Facilities operated by toll authority but charging no toll, code "1".

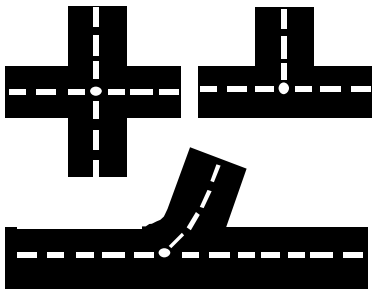
0	Non-toll	1	Toll on any portion

ITEM 30 **Section Length**

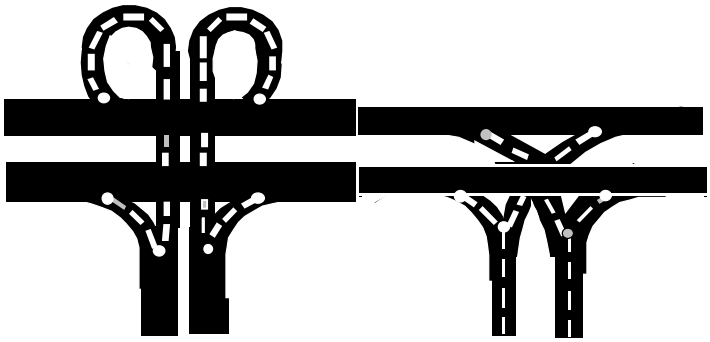
CODE FOR ALL SECTIONS

The length in kilometers [miles (with an implied decimal — example, XXX.XXX)] as measured along the centerline of the roadway. This item is used for tracking the State certified maintained mileage for the Federal government. Used for apportionment, administrative, legislative, analytical, and data base purposes. On independently aligned, divided highways, centerline length also may be reported as the average of the lengths of the directional roadways, measured along their centerlines. Report the length of the two roadways of a one way couplet independently; do not average. Code length to the nearest thousandth. Length cannot be zero coded.

Two-way At-grade Intersections
Length begins at midpoint of the roadway



Freeway Connections Freeway tee intersections - average length of the four connector ramps measured to the gore points.



Sample Panel AADT Volume Group Identifiers

ITEM 31 **Donut Area Sample Panel AADT Volume Group Identifier**

Volume group must be coded for a section when an actual AADT is not reported in Item 33. When an AADT is coded, HPMS software will calculate this item. Use traffic flow maps, count data from local agencies and other available data to make reasonable volume group assignments. Code this item or AADT for all segments that are within the donut area portion of a nonattainment area. The FHWA code is a number from 1 to 5 and is coded “0” for all sections outside the donut areas. *See Appendix D on page A-6 for a listing of NAAQS Ozone Non Attainment Areas.*

ITEM 32 **Standard Sample Panel AADT Volume Group Identifier**

Volume group must be coded for all data records (universe, standard sample, and donut area sample) for all systems *except* for rural minor collector and rural and urban local functional systems, when an AADT is not coded in Item 33. HPMS software will calculate this field if an AADT has been coded. The FHWA code is a number from 1 to 13 and is coded “0” for non-applicable section records.

ITEM 33	**Annual Average Daily Traffic (AADT)** AADT information reported to FHWA will be used by the Federal Environmental Protection Agency (EPA) for monitoring air quality. It provides basic existing traffic inventory information for selected sections. It is extensively used for apportionment, administrative, legislative, analytical and national highway database purposes. Code this numeric data item for all PAS, NHS, and standard sample and donut area supplementary sample sections. Coding is optional for remaining sections. Code "0" when AADT is not coded. The AADT must be a TOTAL FOR BOTH DIRECTIONS OF TRAVEL, unless the street is one-way or part of a couplet. AADT should be count based and adjusted to represent vehicles (axle corrections for trucks and buses unless the equipment used counts vehicles). The count should also be adjusted for weekday and seasonal factors so that it represents an AADT. Growth factors must be applied if the AADT is not derived from current year counts. *See the* Traffic Monitoring Guide *for more information, or see Appendix F on pages A-9 through A-11 for a discussion of AADT.* Local government agencies may use an average weekday traffic volume for their purposes, but HPMS requires reported AADT to be an average daily value that represents all days of the reporting year. Please include local count data by time periods, direction, or vehicle classifications with your submittal whenever available. If AADT information for other streets and roads within your jurisdiction is available, HPMS staff would appreciate receiving copies of that information so that we may update AADT estimates on the non-sampled streets and roads. Without this information, we can only continue to apply average escalation rates to the original AADT estimates for those streets and roads. **FHWA recommends 48 hour counts, which are generally more reliable than 24 hour counts. Under normal situations, midweek counts are recommended.**
Supplemental item	**Year of Traffic Count** This item reflects the year of the actual traffic count. Enter the year in which the most recent traffic count was taken on the roadway segment. During non-count years, AADT may be estimated to reflect the traffic trends for that location.
ITEM 34	**Number of Through Lanes** This item provides basic inventory information on the amount of public road in use. It is used for apportionment, administrative, legislative, analytical and national highway database purposes. Code this numeric data item for all HPMS sections EXCEPT those on the rural minor collector and rural and urban local functional systems. Enter the number of prevailing lanes (those lanes carrying through traffic in the off-peak period) for both directions. Code "0" when data are not provided. **Do not count auxiliary lanes (collector / distributor lanes, weaving lanes, frontage road lanes, parking and turning lanes, acceleration / deceleration lanes, toll collection lanes and truck climbing lanes).**

ITEM 35 Measured Pavement Roughness (IRI)

Required for NHS sections; recommended for all sample sections. A sample section must have either an IRI or PSR.

This item provides information on pavement surface roughness on selected sections. It is used in investment modeling to estimate pavement deterioration, section deficiencies and needed improvements; in cost allocation studies; in pavement condition trends and for other analysis purposes including NHS performance. The International Roughness Index (IRI) is reported in whole inches per mile (x.0) or kilometers (x.xx). Unpaved and non-reported sections are coded "0.0".

Values must be directly derived from measured road profiles; other entries are not to be used. Temporary values for a newly improved section may be entered until a measured value is available. Use pavement management systems when they are applicable and when they meet HPMS reporting requirements. FHWA has adopted AASHTO Provisional Standard PP37-99 as the preferred method of providing IRI data for HPMS. The year in which IRI was obtained should be provided when updating any IRI data.

ITEM 36 Present Serviceability Rating (PSR) - Pavement Condition

PSR may change if Item 53 (Year of Surface Improvement) changes.

This item provides information on pavement condition on selected sections. It is used to estimate pavement deterioration, section deficiencies, needed improvements and for national highway data base purposes. Code PSR to the nearest tenth (X.X) for all paved standard samples where Item 35 (IRI) is not reported. Code "0.0" for unpaved facilities or for unavailable data. Pavement Condition Index (PCI) converted to PSR values can be used. See *Appendix E on page A-7 for Bay Area conversion practices and possible tips.* If no other data are available, an estimate may be derived from the following table.

4.0-5.0	New, nearly new, newly resurfaced or reconstructed pavements are within this range. Pavement is very smooth, free of cracks and patches. Pavement constructed or resurfaced during the data year would normally be rated in this category.
3.0-4.0	Pavement has good riding qualities and only slightly visible signs of surface deterioration. Flexible pavement may show slight evidence of rutting and fine random cracks. Rigid pavements may show evidence of slight surface deterioration such as minor cracks and spalling.
2.0-3.0	Pavement has deteriorated. Riding qualities are noticeably inferior to those of new pavements, and may be barely tolerable at high speeds. Flexible pavement surface defects may include rutting, map cracking and extensive patching. Rigid pavement may have a joint failures, faulting and/or cracking, and some pumping.
1.0-2.0	Pavement has deteriorated to such an extent that it affects the speed of free-flow traffic. Flexible pavement may have large potholes and deep cracks. Distress occurs over 50% of the surface and includes raveling, cracking, rutting. Rigid pavement distress includes joint spalling, patching, cracking, scaling, and may include pumping and faulting.
0.0-1.0	Pavement is extremely deteriorated, passable only at reduced speeds with considerable ride discomfort. Large potholes and deep cracks exist. Distress occurs over 75% of the surface. Needs extensive reconstruction.
0.0	Unpaved section or PSR not provided.

A *rough guide* for estimating the increase in PSR value after resurfacing is to add 1.8 to the prior PSR value. Add 0.5 to 0.9 after a maintenance overlay (AC > 1.0"). Maintenance overlays > 1.0" are considered capital improvements and will increase the PSR value. *Maintenance overlays less than 1" thick or seal coats will not increase the PSR value.*

ITEM 37 **HOV Operations**

This item is used to identify those roadway sections with HOV operations. Code for all sections.

0	Section does not have HOV lanes.
1	Section has exclusive HOV lanes assigned.
2	Section has normal through lanes used as HOV lanes in peak hours.
3	Section has shoulder or parking lanes used as HOV lanes in peak hours.

ITEM 38 **Surveillance Systems - Electronic Metering**

Electronic surveillance collecting real-time traffic data monitoring traffic flow.

0 = no	1 = yes

ITEM 39 **Surveillance Systems - Metered Ramps**

Section has metered entrance ramps.

0 = no	1 = **YES**

ITEM 40 **Surveillance Systems - Permanent Variable Message Signs**

Permanent variable message signs are present.

0 = no	1 = yes

ITEM 41 **Surveillance Systems - HWY Advisory Radio.**

Section is covered by highway advisory radio.

0 = no	1 = yes

ITEM 42 **Surveillance Systems - Cameras**

Section is covered by surveillance cameras.

0 = no	1 = yes

ITEM 43 **Surveillance Systems - Incident Detection**

Section is covered by incident detection technology algorithms.

0 = no	1 = yes

ITEM 44 **Surveillance Systems - Free Cell Phone**

Section is covered by free cell phone to dedicated number other than 911.

0 = no	1 = yes

ITEM 45 **Surveillance Systems - On-Call Service Patrol or Towing**

Section is covered by publicly sponsored on-call service patrol or towing service.

0 = no	1 = yes

ITEM 46 **Surveillance Systems - In-vehicle Signing Hardware**

Hardware present to provide in-vehicle signing information to equipped vehicles.

0 = no	1 = yes

Items 37 - 46 are required for all records

ITEM 47 **Sample Identifier**

The sample identifier is a unique 12-character alphanumeric value that is applied to each sample. It is used to track standard and supplementary sample sections over time, and will not change even if the mileage or section number changes. The State may change the Section Identification (Item 5) if necessary; the State Control Field (Item 8) should be used for additional State required identifiers. The following format is used to initially code this item:

XX YYY ZZZZZZZ

WHERE	**XX**	**=**	**Caltrans district**
	YYY	**=**	**FIPS county**
	ZZZ ZZZ(.)Z	**=**	**route and post mile for State routes**
	ZZZZ ZZZ	**=**	**route and section number for local roads.**

ITEM 48 **Donut Area Expansion Factor**

Donut area expansion factor is the ratio of the total length of all segments in the volume group to the total sampled volume group length. This value is calculated and coded to the donut area sample section by the HPMS software using the volume group information in Item 31 (Donut Area Sample Group Identifier).

$$\text{DONUT EXPANSION FACTOR} = \frac{\text{Total length in the volume group within the donut area}}{\text{Sampled length in the volume group within the donut area}}$$

If the expansion factor for a volume group **exceeds** 100.000, additional sample sections from the universe volume group must be selected until the expansion factor is reduced to a **maximum** of 100.000. *See Appendix D on page A-6 for a list of NAAQS nonattainment areas.*

ITEM 49 **Standard Sample Expansion Factor**

Standard sample factor is the ratio of the total length in a volume group to the total sampled volume group length. This value is calculated and coded to the standard sample section by the HPMS software using the volume group information in Item 32 (Standard Sample Group Identifier).

$$\text{STANDARD SAMPLE EXPANSION FACTOR} = \frac{\text{Total length in the volume group}}{\text{Sampled length in the volume group}}$$

If the expansion factor for a volume group **exceeds** 100.000, additional sample sections from the universe volume group must be selected until the expansion factor is reduced to a **maximum** of 100.000.

ITEM 50 Surface / Pavement Type

Enter the code that best represents the type of surface on the section. Report more detailed type only if known. Most common surfaces are3 (bituminous, intermediate), 4 (bituminous, high) and 71 (PCC, high).

1	**UNIMPROVED** - Natural surface road - few or no improvements. Barely passable by standard passenger cars **— UNPAVED.**
2	**LOW TYPE BITUMINOUS SURFACE TREATED** - With or without a sealcoat, total compacted thickness is less than 25 millimeters (1 inch) of surfacing **— LOW TYPE FLEXIBLE.**
3	**INTERMEDIATE TYPE MIXED BITUMINOUS** - or bituminous penetration surface [Surface course greater than 25 mm (1 inch) and less than 178 mm (7 inches) in compacted thickness] Mixture composed of gravel, stone, sand or similar material, and mixed with bituminous material under partial control as to grading and proportions or bound with bituminous penetration material **— INTERMEDIATE TYPE FLEXIBLE.**
4	**HIGH TYPE MIXED BITUMINOUS OR BITUMINOUS PENETRATION SURFACE** - On a flexible base with 178 mm (7 inches) or more in combined surface and base. Includes any bituminous concrete, sheet asphalt or rock asphalt having a high load-bearing capacity. Includes any brick, stone, wood or steel block pavement with or without a wearing surface of less than 25 millimeters (1 inch). **— HIGH TYPE FLEXIBLE**.
5	**HIGH TYPE PORTLAND CEMENT CONCRETE (PCC) PAVEMENT** - with or without joints or reinforcement (such as mesh or similar). Includes continuously reinforced PCC pavement, PCC pavement over PCC pavement (either bonded, unbonded, or partially bonded) and PCC pavement over a bituminous pavement (either mixed or penetration). **— HIGH TYPE RIGID.**
6	**HIGH TYPE MIXED BITUMINOUS OR BITUMINOUS PENETRATION SURFACE ON A RIGID PAVEMENT** - With a combined surface and base thickness of 178 millimeters (7 inches) or more. Includes any bituminous concrete, sheet asphalt or rock asphalt overlay of rigid pavement that is greater than 25 millimeters (1 inch) of compacted bituminous material; otherwise use code “5” **— HIGH TYPE COMPOSITE.**

ITEM 51 Structural Number (SN) or Slab Thickness (D)

Required for all PAVED SAMPLE SECTIONS

This item provides specific information about the pavement section in terms of SN for flexible pavement or D (thickness, *depth*) for rigid pavement on sample roadway sections. It is used to estimate pavement deterioration and loading history and in the cost allocation pavement model. Code this numeric item for all standard sample sections. Enter the SN value to the nearest tenth (xx.x) or D to the nearest whole millimeter or inch (xx.0). for **ALL PAVED SAMPLE SECTIONS.** Use State- specific typical value if actual value is not known. Code this item consistently with Item 3 (Reporting Units - Metric or English).

Some typical SN values:

		FUNCTIONAL CLASS								
PAVEMENT TYPE	***SURF TYPE***	1	2	6	7	11	12	14	16	17
LOW	2	4.7	3.4	2.8	2.5	5.2	3.2	2.9	2.6	2.4
INTERMEDIATE	3	4.7	3.4	3.1	2.9	5.2	4.6	4.0	3.4	3.0
HIGH TYPE FLEXIBLE	4	5.2	3.9	3.3	3.3	5.2	4.6	4.0	3.4	3.1
HIGH TYPE COMPOSITE	6	5.9	5.1	5.2	4.6	5.7	5.4	5.0	4.8	4.3

ITEM 52 General Climate Zone

This item is calculated by HPMS Software, but may be changed as necessary. It is used in the cost allocation model.

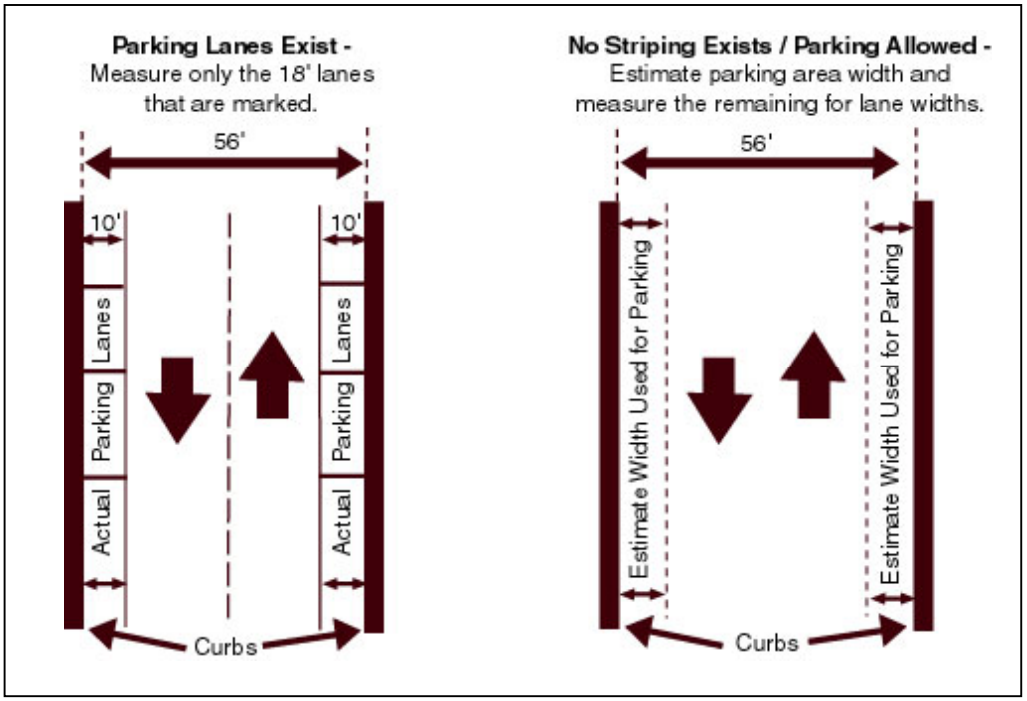
01	Wet	Freeze	Long winters with temperatures below freezing for extended periods.
02	Wet	Freeze/ Thaw	Winters with more temperature fluctuation around the freezing point.
03	Wet	No Freeze	Relatively mild winters.
04	Intermediate	Freeze	Long winters with temperatures below freezing for extended periods.
05	Intermediate	Freeze/ Thaw	Winters with more temperature fluctuation around the freezing point.
06	Intermediate	No Freeze	Relatively mild winters.
07	Dry	Freeze	Long winters with temperatures below freezing for extended periods.
08	Dry	Freeze/ Thaw	Winters with more fluctuation of the temperatures about the freezing point.
09	Dry	No Freeze	Relatively mild winters.

ITEM 53 Year of Surface Improvement

This item is used to identify the year in which the sample section roadway surface was last improved. It is used in the cost allocation pavement model to deteriorate pavement condition. Enter the 4-digit year when the last surface improvement was completed on the segment. Retain the coded improvement year in this data item until another improvement has been the made on the section. Code "0" if the section has not been improved since 1988. Include any improvements made after 1987 on the section. The definition of an HPMS Surface Improvement is one that included a minimum of 25 millimeters (one inch) of compacted pavement material.

ITEM 54 Lane Width

This item is a measure of existing lane width on sample roadway sections. It is used for investment modeling to calculate capacity, estimate needed improvements, and compute a safety index, for cost allocation pavement models, and for other policy analysis and national highway data base purposes. Enter the predominant through traffic lane width to the nearest tenth of a meter (x.x), or whole foot (x.0), typically 12'. Code according to the reporting units chosen for Metric (or English) Reporting Units (Item 3). Code according to striping, traffic use or design guidelines if little or no striping is present. Where there is no delineation between the through traffic lane and the shoulder or parking lane, or where there is no centerline, estimate a reasonable split between the actual width used by traffic and the shoulder or parking.



ITEM 55 Access Control

This item is a measure of the degree of access control on sample roadway sections. It is used in investment requirements modeling to calculate capacity and estimate type of design, in truck size and weight studies, and for national highway data base purposes. Required for all standard sample sections.

1	**Full Access Control (freeway)-** Preference given to through traffic movements using selected location interchanges. No at-grade crossings or direct driveway connections.
2	**Partial Access Control (expressway)-** Preference given to through traffic movement. using some interchanges, some at-grade crossings. Using frontage roads or other access restrictions minimizes direct private driveway connections. Control of curb cuts is not considered access control.
3	**No Access Control (conventional)-** Includes all sections not mentioned above.

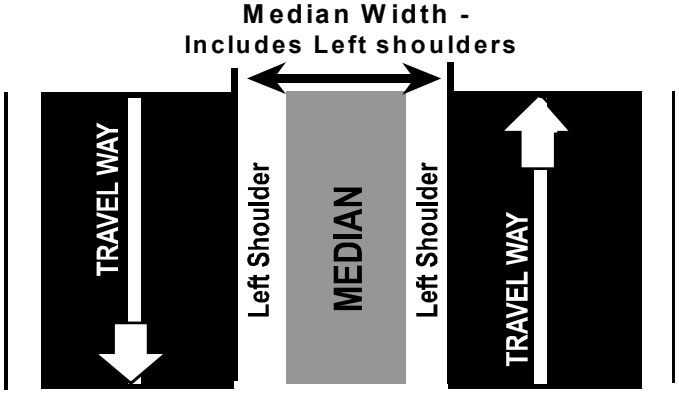
ITEM 56 Median Type

This item is used in investment requirements modeling to calculate capacity, estimate type of design and for national highway data base purposes. Code the type of median for all standard sample sections.

1	Curbed
2	Positive Barrier (Usually guardrail or concrete barrier: may be impenetrable shrubbery)
3	Unprotected [May be marked. Continuous crosshatching at least 1.2 meters (4 feet) wide may be considered a median as long as it is not used as a turning lane by law.]
4	None (Turning lanes/bays are NOT considered medians unless cut into a median Extending through the major portion of the segment. Continuous turning lanes are not considered medians.)

ITEM 57 Median Width

This item is used in investment modeling to calculate capacity, estimate type of design and for national data base purposes. Code the predominant median width to the nearest tenth of a meter (x.x) or the nearest foot (x.0). Enter “0.0” where Item 56 is coded “0” or “4”. **Enter “999.9” for a median width greater than 33 meters (100 feet).** The median width should be measured between the inside edges of the opposing through lanes (including the median shoulders, if any). Continuous turn lanes are not applicable. Ignore turning bays cut into the median.



ITEM 58 Shoulder Type

This item is used in investment requirements modeling to estimate needed improvements. Enter the code for the predominant shoulder type existing throughout the segment.

1	None - no shoulders or curbs exist.
2	Surfaced shoulder exists (includes bituminous or Portland cement surface).
3	Stabilized shoulder exists (includes stabilized gravel or other granular material with or without admixture).
4	Combination shoulder exists (part of the shoulder width is surfaced, a part is stabilized, and/or a part is earth, etc.).
5	Earth shoulder exists.
6	Barrier curb exists; no shoulder exists in front of curb.

Some FHWA rules for coding this item:

⇒ Left and right shoulders vary, right shoulder is the predominant type (example 58a).

⇒ If a curb and shoulder exist, code the appropriate surface type of the shoulder, ignoring the curb (example 58f on next page).

⇒ If there is a parking or bike lane abutting the through lane, no shoulder can exist [except combination bike/shoulder lanes, which are considered shoulders. Width of whole lane must be coded in Item 59 (Right Shoulder Width)] (example 58b).

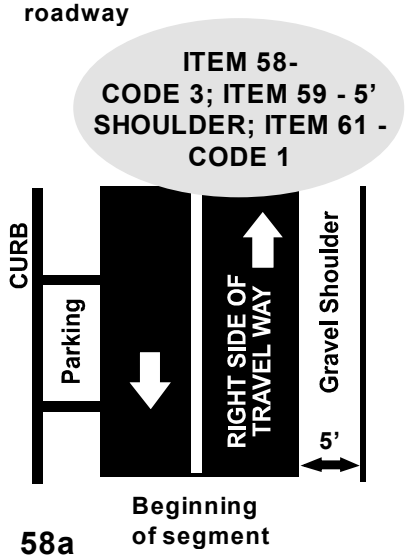
⇒ If there is parking on one side of a divided roadway and a shoulder or curb on the other, code shoulder type and width from right side and parking in Item 61 (ex. 58a)

⇒ A shoulder cannot exist between a traffic lane and a parking lane (example 58b).

⇒ If a bike lane or parking is completely separated from the roadway, it should be ignored (example 58c).

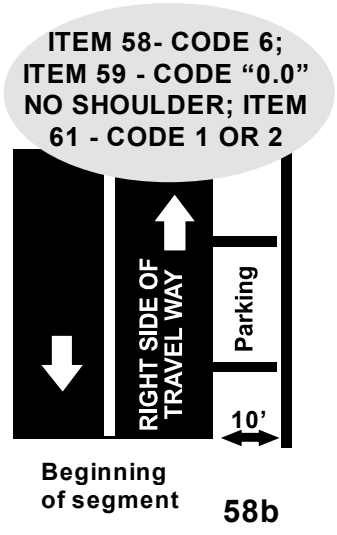
EXAMPLES:

Conflicting Shoulder Codes - code only right side of the roadway



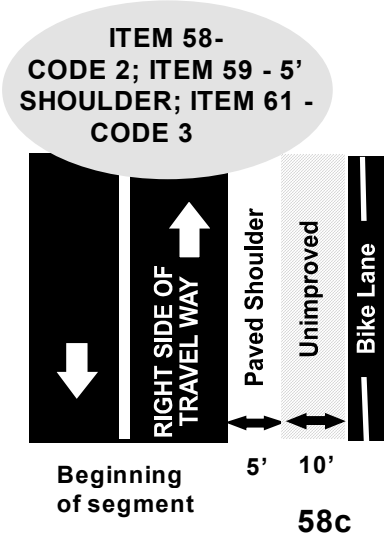
58a

Parking or Bike Lane - no shoulder unless combined shoulder/ bike lane



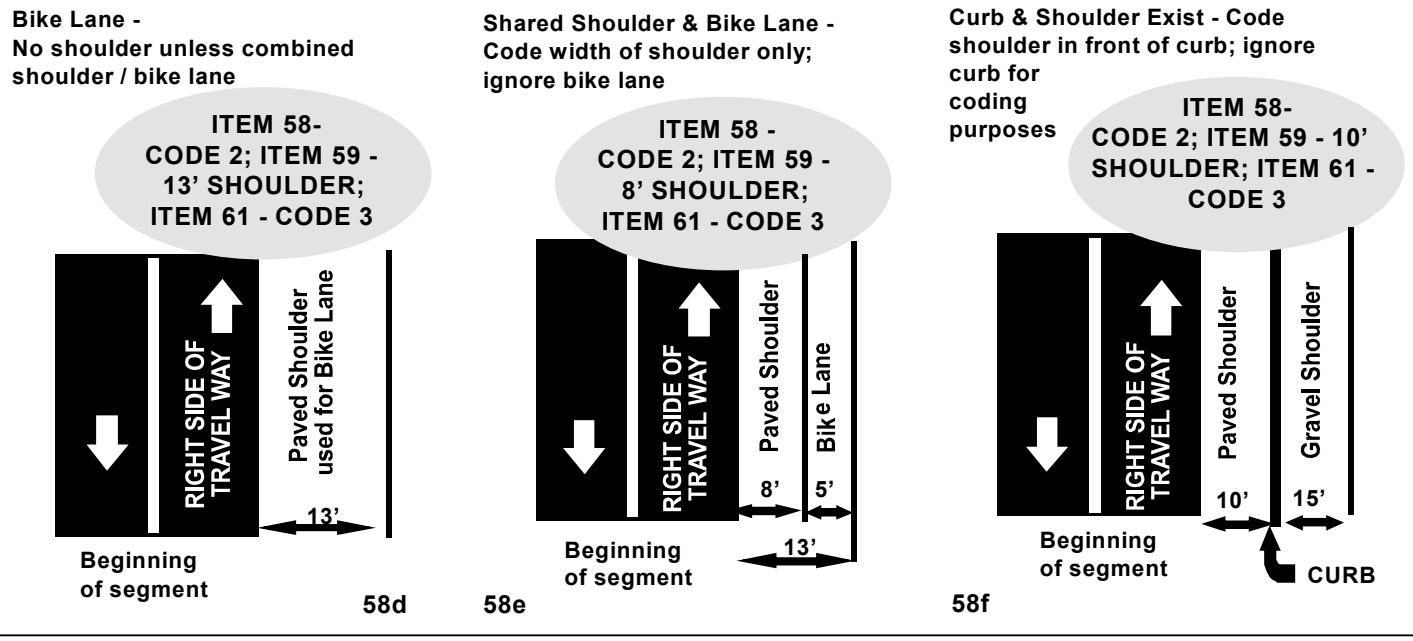
58b

Bike Lane Outside Roadway - ignore bike lane



58c

MORE EXAMPLES ON THE FOLLOWING PAGE



MORE EXAMPLES ON THE PREVIOUS PAGE

ITEM 59 **Right (outside) Shoulder Width** - Enter the predominant width to the nearest whole foot (x.0). Code "0.0" if no right shoulder exists. Width of the shoulder does not include parking or bike lanes (see examples in Item 58).

ITEM 60 **Left (median) Shoulder Width** - predominant width. A left shoulder width occurs only where a divided highway and median exist. Do not include width for a left shoulder if it is part of a continuous left turn lane.

ITEM 61 **Peak Parking**

Item 61 code must correlate with Item 58

This item is reported only on URBAN sample sections. It is used in investment modeling to calculate capacity on sections with signals. Enter the code that best reflects the type of peak parking that exists. Code to reflect permitted use; even if the section is not formally signed or striped for parking. If parking is beyond the shoulder or the pavement edge, use code '3' for no parking. If parking lanes are legally used for through traffic or turning lanes during the peak-hour, code the appropriate in-use condition.

0	Not reported (rural section)	2	Parking is permitted, both sides
1	Parking is permitted, one side only	3	No parking allowed or none available

ITEM 62 **Widening Feasibility**

This item represents the lanes that COULD be added in each direction. Physical features, topography and buildings, not the current right-of-way width or local politics, are considered. Medians and other areas within the right of way are considered; restriping for narrow lanes is not considered. This item is used to estimate needed capacity improvements.

1	No widening is feasible.	4	Two lanes only in each direction.
2	Partial lane in each direction is feasible.	5	More than two lanes may be added, each direction.
3	One lane only in each direction.		

Curves by Class (Horizontal Alignment)

Enter length in miles (kilometers) of the SUM of all curves in each class. Each curve and tangent segment is counted as a separate curve. Sum of ALL curve lengths must equal section length (Item 30).

Items 63-68 are required for ALL ARTERIAL SAMPLE SECTIONS (Except Urban, Minor Arterial)

CODED BY HPMS STAFF

NOTE:
If segment length (Item 30) changes, Curves by class and possibly Item 69 (Horizontal Alignment Adequacy) may change.

ITEM NO.	CURVE CLASS	DEGREE OF CURVATURE (English)	CURVE RADIUS RANGE (Feet)	RADIUS LENGTH (Metric)	APPROXIMATE DESIGN SPEED (MPH)
63	A	0 - 3.4	1,661 to Tangent	506 +	70
64	B	3.5 - 5.4	1,051 to 1,660	321 - 505	60
65	C	5.5 - 8.4	681 to 1,050	206 - 320	50
66	D	8.5 - 13.9	411 to 680	126 - 205	40
67	E	14.0 - 27.9	206 to 410	61 - 125	30
68	F	28.0 +	0 to 205	< 61	< 20

ITEM 69 **Horizontal Alignment Adequacy**

This item is required for all paved RURAL Major Collector samples unless Curves by Class (Items 63-68) are reported for the section; in which case, software calculates this field. It provides information about the adequacy of horizontal alignment when curve data are not reported, and is used to estimate horizontal alignment deficiencies and in truck size and weight analyses. If this item is coded 3 or 4, curves must be broken down into total length within the different ranges for Items 63-68.

0	Not reported (urban section).
1	All curves meet appropriate design standards.
2	All curves can be safely and comfortably negotiated at the prevailing speed limit.
3	Infrequent curves exist with design speeds less than the prevailing speed limit.
4	Several curves exist that are uncomfortable and/or unsafe when traveling at the prevailing speed limit.

ITEM 70

Type of Terrain

This item applies only to **RURAL** functional systems. Code the predominant terrain type. It is used in investment modeling to calculate capacity and estimate needed capacity improvements. It is also used in truck size and weight analyses. Terrain classification pertains to the general character of a specific route corridor (generally level or rolling routes traversing steep terrain should be classified as level or rolling).

0	Not reported (Urban or non-sample section).
1	Flat terrain (sight distances long).
2	Rolling terrain (natural slopes rise above and fall below the highway grade).
3	Mountainous terrain (slopes are abrupt).

ITEM 71

Vertical Alignment Adequacy

This item is required for all paved rural samples unless Grades by Class (Items 72-77) are reported for the section. If this item is coded 3 or 4, grades must be broken down into total length within the different grade classes in Items 72 to 77.

0	Not reported (Urban or non-sample section).
1	All grades and vertical curves meet minimum design standards appropriate for the terrain.
2	All grades and vertical curves provide sight distance for safe travel and do not substantially affect the speed of trucks.
3	Infrequent grades and vertical curves exist that impair sight distance and/or affect truck speeds and no truck lanes exist.
4	Frequent grades and vertical curves exist that impair sight distance and/or severely affect the speed of trucks.

ITEMS 72 - 77

Grades by Class (Vertical Alignment)

These items provide information about the class and length of vertical grades for sample sections. The data are used for investment modeling to calculate vertical alignment adequacy, estimate running speed and operating costs, and are also used in truck size and weight analyses. Code “0.0” when grade data are not reported; then, Item 71 (Vert. Align. Adequacy) must be coded. Each grade and flat segment is counted as a separate “grade”. List the total length in miles of all curves within each class to 3 decimals (XX.XXX). For each sample, the sum of the grade lengths in all the classes must equal the section length.

ITEM NO.	GRADE CLASS	GRADIENT (PERCENT)
72	A	0 - 0.4
73	B	0.5 - 2.4
74	C	2.5 - 4.4
75	D	4.5 - 6.4
76	E	6.5 - 8.4
77	F	8.5 +

CODED BY HPMS STAFF - If the segment length (Item 30) changes, Grades by Class and possibly Item 71 (Vertical Alignment Adequacy) may change.

Required for ALL ARTERIAL SAMPLE SECTIONS

ITEM 78 **Percent Passing Sight Distance**

This item provides information on the percent of the sample section meeting the sight distance requirement for passing [distance > 1500 feet (460 m)]. It is used in investment modeling to calculate capacity, to estimate running speed and for truck size and weight analysis purposes. Enter the percent of the length, which is striped for passing, estimated to the nearest 10%. Subtract section lengths striped for no passing if they are striped for insufficient sight distance and not simply for intersections or other reasons. Nonapplicable or very curved and/or hilly sections may be coded "0". Code this numeric item for all rural, paved two-lane sample sections.

ITEM 79 **Weighted Design Speed**

This item provides a design speed weighted by the length of individual horizontal curves and tangents in a sample section. It is used in investment modeling to calculate capacity and estimate needed capacity improvements. When curve data are available, HPMS software calculates this field to the nearest 5 MPH. Otherwise, a default value is used based upon functional system and facility type as shown in the following table:

	Functional System								
Facility Type	**1**	**2**	**6**	**7**	**11**	**12**	**14**	**16**	**17**
Multilane Divided	**70**	**70**	**70**	**65**	**70**	**70**	**70**	**60**	**55**
Multilane Undivided	**70**	**70**	**70**	**60**	**70**	**70**	**70**	**55**	**45**
2 or 3 Lane	**70**	**70**	**65**	**60**	**70**	**65**	**65**	**55**	**45**

ITEM 79 IS A CALCULATED FIELD IN THE FEDERAL SOFTWARE. THE VALUE IS CALCULATED FROM CURVE DATA REPORTED ON THE SECTION.

ITEM 80 **Speed Limit**

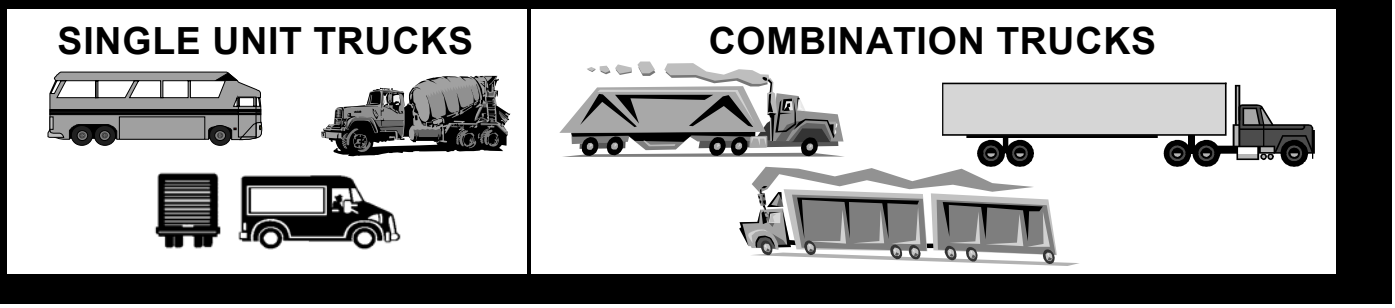
This item provides information on the posted speed limit on sample sections. It is used in investment modeling to estimate running speed and for other analyses, including delay estimation. Enter the daytime speed limit for autos posted or legally mandated on the greater part of the section. If there are no legally mandated limits, code "999". Use predominant speed limit where more than one exists. Do not average.

Percent Trucks in Peak and Average Traffic Flow

Items 81-84 provide information on truck use on sample sections. Items 81 and 83, trucks in peak period, are used in investment modeling to calculate capacity and design volumes. Items 82 and 84 are used to estimate pavement deterioration and operating speeds, in cost allocation pavement model, and in truck size and weight analyses. Updates are required when Item 33 (AADT) is updated. Code peak % the same as average or estimated peak, if no better data are available. Some routes, such as urban commuter or recreational routes may exhibit noteworthy differences in truck percentages between peak and average. These differences could have a significant impact on route capacity.

ITEM 81	**% Single Unit Trucks in Peak Period** Code single unit truck traffic (see illustration below) in the peak traffic period as a percentage of total peak period traffic flow to the nearest whole percent.
ITEM 82	**% Single Unit Trucks in Average Daily Traffic Flow** Code the single unit truck traffic (see illustration below) in the average daily traffic flow to the nearest whole percent. This value should be representative of all single unit truck activity over all days of the week and seasons of the year as a percent of total annual traffic. Single unit trucks include vehicle classes 4 through 7 (buses through four-or-more axle single-unit trucks).
ITEM 83	**% Combination Trucks in Peak Period** Code combination unit truck traffic (see illustration below) in peak traffic period as a percentage of total peak period traffic flow to the nearest whole percent.
ITEM 84	**% Combination Trucks in Average Daily Traffic Flow** Code the combination unit truck traffic (see illustration below) in the average daily traffic flow to the nearest whole percent. This value should be representative of all combination truck activity over all days of the week and seasons of the year as a percent of total annual traffic. Combination trucks include vehicle classes 8 through 13 (four-or-more axle single-trailer trucks to seven-or-more axle, multi-trailer trucks).

Below are some examples of single unit and combination trucks. These are not the only types of trucks in these categories. Basically, single unit trucks have at least six wheels with no trailers and combination trucks have any variety of trailer combinations.



ITEM 85 **K-Factor** (**Design Hour Volume)**

Design Hour Volume (approximately the 30th highest volume hour of the year for both directions of travel) as a percentage of the annual average daily traffic (AADT). It is also roughly the normal peak hour volume for both directions of travel divided by the AADT. This data item is used in investment modeling to calculate capacity and estimate needed capacity improvements, in the cost allocation pavement model, and for other analyses, including delay estimation. Code the K-Factor to the nearest percent; normal ranges are from 6 to 18 percent.

Items 85 & 86 are required for all sample sections. These items should be updated when a new traffic count is made on the section to satisfy AADT (Item 33) requirements.

If no better data are available, count traffic (both directions) for at least 15 minutes during a normal peak hour; multiply the count by 4 and divide by AADT to get the K-Factor. Normal, non-freeway range from 9% to 15%. Heavily congested freeways range from 6% to 8%. Many traffic counts summarize hourly information from which peak hour data can be derived. Peak hour can then be divided by total daily count data for an approximate K-Factor. As noted in the description below for Item 86, if data are collected by direction, directional factor may be calculated from this same data.

ITEM 86 **Directional Factor (D Factor)**

Enter the percent of the peak hour volume (K-factor) flowing in the peak direction to the nearest 5%. This is normally 50 - 75% (100% for one-way facilities). This item is used for investment modeling to calculate capacity and estimate needed capacity improvements, in congestion, delay and other analyses, and in the cost allocation pavement model. If the K-Factor (Item 85) is obtained from a short count duration during a normal peak hour, collect that data by direction so that it may also be used to calculate the directional factor**.**

If no better data are available*,* count and classify vehicles for 15 minutes during the off-peak travel period on a weekday and report that for the percent average. Then report 2/3 of that count for percent peak (or percent peak times 1.5 for percent average). Neighborhood streets may have delivery or garbage trucks that should be counted for these purposes. Arterial or collector streets which have < 3% trucks for Item 82 are rare but do exist.

ITEM 87 **Number of Lanes in Peak Hour Direction**

Code number of through lanes used in peak period in peak direction (include reversible lanes, shoulders or parking lanes - legally used for through traffic, either for HOV or SOV). For rural 2- or 3- lane facilities, code the number of through lanes in both directions in peak period. This item is used in investment modeling to calculate capacity, and in congestion analyses, including estimates of delay. It will also be used in the Highway Capacity Manual based capacity calculation procedure.

Left / Right Turning Lanes / Bays

These data items are used in investment requirements modeling to calculate capacity and in congestion analyses, including estimates of delay. Code that which best describes the peak-period turning lane operation on the sample section. Code for a typical intersection unless peak capacity is governed by a particular intersection, then code for that intersection. Code turning lanes and the percent green time for the same intersection. Some rules to help guide you:

- If a continuous turn lane has painted turn bays, it is considered a turn lane (see 88a).
- If a through lane becomes an exclusive turning lane at an intersection, it is considered a turning lane (see 88b).
- If both through and turning movements can be made legally from a lane, it is not a turning lane (see 88c).
- If the turning bay is too short to handle turning traffic and the traffic routinely blocks the through lane, code as no turning lane (see 88c).

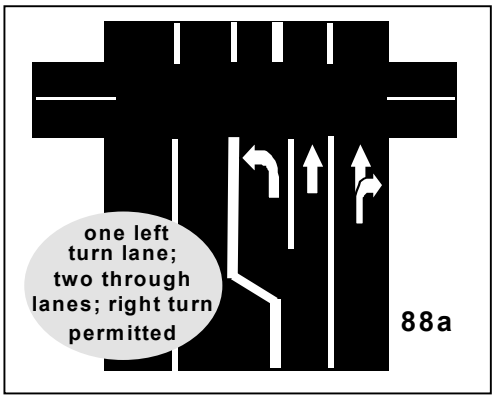
If a turning lane/bay is located at the entrance of a shopping center, industrial park or other large traffic generating enterprise, code as a turn lane.

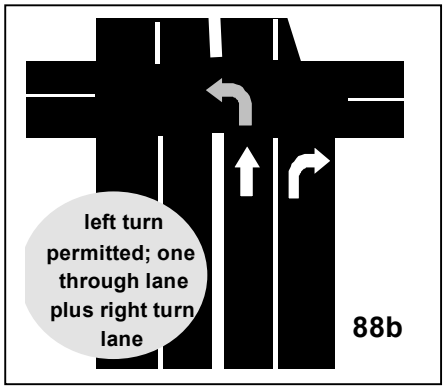
ITEM 88 Left Turning Lanes

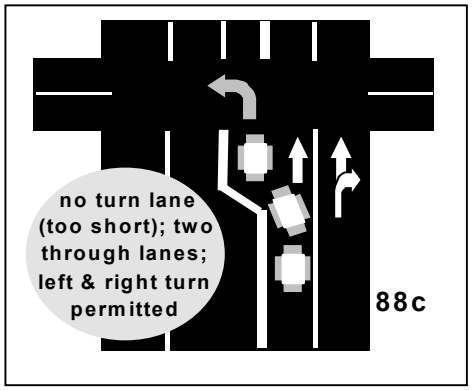
0	Rural area or **no intersections** exist.
1	Multiple left turning lanes exist. Continuous left turning lane that becomes multiple left turning lanes prior to the intersection.
2	Continuous left turning lane exists between intersections. Through movements are prohibited in these lanes. Continuous left turning lanes are NOT considered a median.
3	Single left turning lane exists.
4	Left turns are permitted, but no left turning lanes exist.
5	No left turns permitted during peak period.

ITEM 89 Right Turning Lanes

0	Rural area or **no intersections** exist.
1	Multiple right turning lanes exist where no through movements are allowed. May be continuous right turning lane that becomes multiple right turn lanes prior to the intersection.
2	Continuous right turning lane exists from intersection to intersection.
3	Single right turning lane exists.
4	Right turns are permitted, but no right turning lanes exist.
5	No right turns permitted during peak period.







ITEMS 90, 91 & 92 ARE RELATED: If Item 90 (Type of Signalization) is coded "1", "2" or "3", Item 91 must be > 0. In addition, if Item 92 (Number of signalized intersections) is > 0, Item 91 must also be > 0.

ITEM 90 Prevailing Type of Signalization

Code the predominant type of signalization in the direction of travel on a sample section. This item is used in investment modeling to calculate capacity and estimate delay. If signals are reported (Item 92) this item must contain a value from 1 to 3. If no signals are reported, this item must contain a "4".

Urban Item; Rural coding optional

0	Not reported (rural section).	3	Progressive
1	Uncoordinated fixed time.	4	No signal system.
2	Traffic actuated		

ITEM 91 Typical Peak Percent Green Time

Enter the percent of peak hour that a signal on a typical intersection on the segment remains green in the inventory direction. If an intersection is critical to capacity on the entire section, enter percent for that signal. Generally, the same intersection used to code Items 88 and 89 should be used. The data are used for investment modeling to calculate capacity and in congestion analyses, including delay estimates. Percentage entered here should be less than 86%. Code "0" for no signals on the section, or if the section is rural. Local traffic engineers are the best source for this data; however, a good approximation may be obtained by calculating the ratio of AADTs for both streets at a typical or critical intersection.

ITEMS 92 TO 94 - Number of At-grade Intersections with Public Roads

These items provide the number of at-grade intersections and traffic controls on the sample section. They are used in investment modeling to calculate capacity and estimate delay. Include at-grade intersections at entrances to shopping centers, industrial parks and other large traffic generators. If the segment begins and ends with an intersection, California has adopted the rule to always count the end intersection, never both. Count all other intersections with public roads within the segment. When there are non-aligned intersections along the segment, count the intersections at the right of the inventory direction only. Code the number of intersections along the inventory route using the following table:

ITEM 92	**Signals** - Number of intersections controlled by signals. Signal cycles through red, yellow and green at least part of the day. If none, enter "0".
ITEM 93	**Stop Signs** - Number of intersections controlled by stop signs. A continuously flashing red signal should be coded as a stop sign. If none, enter "0".
ITEM 94	**Other or No Controls -** Number of intersections where there is no control on the intersection, or control is managed by signing or other types of controls. A flashing yellow light should be coded in this category.

ITEM 95 **Peak Capacity**

This item provides existing peak hour capacity for a sample section. It is used in investment requirements modeling to calculate capacity, in the cost allocation pavement model, and in congestion, delay and other analyses. The Federal software conforming to the Highway Capacity Manual guidelines calculates this field. States may override the calculation if necessary, to get a more accurate figure. Urban capacity represents the hourly capacity for one direction reflecting the peak-period situation for Level of Service "E". Rural freeways and multi-lane facilities represent the same (one direction), While rural facilities with 2 or 3 lanes and two-way operation is for both directions.

Capacity involves many different data items and how they relate. Items 95 & 96 are coded by the HPMS Federal Software, but for a description of Levels of Service and other related subjects, refer to the Transportation Research Board (TRB 1994) Highway Capacity Manual.

ITEM 96 **Volume / Service Flow Ratio (V/SF)** or volume/capacity ratio

This item reflects peak hour congestion for a sample section. It is used in investment modeling to estimate needed capacity improvements, in the national highway database and for congestion, delay and other data analyses. This value is generated by the HPMS software rough formulas:

$$\text{V/SF (Rural 2 or 3 lanes)} = \frac{[\text{AADT (Item 33)}] \times [\text{K-Factor (Item 85)}]}{\text{Peak Capacity (Item 95)}}$$

$$\text{V/SF Rural multi-lane and all urban} = \frac{[\text{AADT (Item 33)}] \times [\text{K-Factor (Item}] \times [\text{D- Factor (Item 67)}]}{\text{Peak Capacity (Item 95)}}$$

Item 97 and Item 98 are especially important in air quality non-attainment areas where EPA requires VMT reduction programs.

ITEM 97 **Future AADT (Annual Average Daily Traffic)**

This item provides forecast AADT (total for both directions) for sample sections. It is used in investment modeling to estimate deficiencies and future improvement needs, in cost allocation pavement modeling and other analyses. Code the forecasted two-way AADT for the year coded in Item 98, Year of Future AADT. The intent is to include a 20-year forecast in the HPMS, but the estimate may be for any period within an 18 to 25 year time span. Data should be consistent with regional or local traffic models, however link to link comparisons may not be possible due to differences in the local and State networks.

MUST BE UPDATED WHEN FORECAST FALLS BELOW 18 YEARS.

ITEM 98 **Year of Future AADT**

Enter the four digit year for which Future AADT *Item 97) has been forecasted. This item is used to normalize the forecast AADT to a consistent 20-year horizon. See Item 97 explanation for year parameters.

Highway Performance Monitoring System

Appendices

COUNTY FIPS CODES AND ABBREVIATIONS
APPENDIX A

COUNTY	ABBREV	FIPS	COUNTY	ABBREV	FIPS
Alameda	ALA	001	Orange	ORA	059
Alpine	ALP	003	Placer	PLA	061
Amador	AMA	005	Plumas	PLU	063
Butte	BUT	007	Riverside	RIV	065
Calaveras	CAL	009	Sacramento	SAC	067
Colusa	COL	011	San Benito	SBT	069
Contra Costa	CC	013	San Bernardino	SBD	071
Del Norte	DN	015	San Diego	SD	073
El Dorado	ED	017	San Francisco	SF	075
Fresno	FRE	019	San Joaquin	SJ	077
Glenn	GLE	021	San Luis Obispo	SLO	079
Humboldt	HUM	023	San Mateo	SM	081
Imperial	IMP	025	Santa Barbara	SB	083
Inyo	INY	027	Santa Clara	SCL	085
Kern	KER	029	Santa Cruz	SCR	087
Kings	KIN	031	Shasta	SHA	089
Lake	LAK	033	Sierra	SIE	091
Lassen	LAS	035	Siskiyou	SIS	093
Los Angeles	LA	037	Solano	SOL	095
Madera	MAD	039	Sonoma	SON	097
Marin	MRN	041	Stanislaus	STA	099
Mariposa	MPA	043	Sutter	SUT	101
Mendocino	MEN	045	Tehama	TEH	103
Merced	MER	047	Trinity	TRI	105
Modoc	MOD	049	Tulare	TUL	107
Mono	MNO	051	Tuolumne	TUO	109
Monterey	MON	053	Ventura	VEN	111
Napa	NAP	055	Yolo	YOL	113
Nevada	NEV	057	Yuba	YUB	115

URBANIZED (U) AND LARGE URBANIZED (L) AREA CODES APPENDIX B

URB AREA (RSU=U) (POP>50,000 & <200,000)	URB AREA (RSU=L) (POP>200,000)	CODE	COUNTY
Antioch-Pittsburgh		257	CC
	Bakersfield	117	KER
Chico		298	BUT
Davis		381	YOL
Fairfield		299	SOL
	Fresno	080	FRE
Hemet-San Jacinto		300	RIV
Hesperia-Apple Valley-Victorville		391	SBD
Indio-Coachella		396	RIV
	Lancaster-Palmdale	301	LA
Lodi		400	SJ
Lompoc		402	SB
	Los Angeles	002	LA, ORA, SBD, VEN
Merced		380	MER
	Modesto	234	STA
Napa		302	NAP
	Oxnard-Ventura	224	LA, VEN
Palm Springs		303	RIV
Redding-Anderson		304	SHA
	Riverside- San Bernardino	048	RIV, SBD
	Sacramento	042	PLA, SAC, YOL
Salinas		229	MON
	San Diego	023	SD
	San Francisco-Oakland	006	ALA, CC, MRN, NAP, SF, SM, SOL
	San Jose	032	SCL
San Luis Obispo		410	SLO
Santa Barbara		187	SB
Santa Cruz		258	SCR
Santa Maria		305	SB
	Santa Rosa	235	SON
Seaside-Monterey		236	MON
Simi Valley		237	VEN
	Stockton	119	SJ
Vacaville		417	SOL
Visalia		306	TUL
Watsonville		419	MON, SCR
Yuba City		307	SUT, YUB
Yuma (Arizona)		287	IMP

SMALL URBAN AREA CODES (S) POP 5,000 - 49,999 — APPENDIX C

SMALL URBAN NAME	CODE	CO	SMALL URBAN NAME	CODE	CO
Adelanto	00296	SB	Dinuba	19318	TUL
Alpine	01192	SD	Discovery Bay	19339	CC
Alta Sierrra	01360	NEV	Dixon	19402	SOL
Arcata	02476	HUM	Earlimart	20438	TUL
Arroy Grande-Grover City-Oceano-Pismo Beach	02868	SLO	El Centro	21782	IMP
Arvin	02924	KER	El Dorado Hills	21880	ED
Atascadero	03064	SLO	Eureka	23042	HUM
Atwater	03162	MER	Exeter	23126	TUL
Auburn-N Auburn	03204	PLA	Farmersville	23616	TUL
Avenal	03302	KIN	Fillmore	24092	VEN
Banning-Beaumont-Cherry Vly	03820	RIV	Fort Bragg	25058	MEN
Barstow	04030	SBD	Fortuna	25296	HUM
Baywood Pk-Los Osos	04534	SLO	Galt	28112	SAC
Big Bear Lake	06392	SBD	Gilroy	29504	SCL
Blythe	07218	RIV	Golden Hills	30281	KER
Bonadelle-Madera Ranchos	07379	MAD	Grass Valley-Nevada City	30798	NEV
Brawley	08058	IMP	Greenfield	30994	MON
Calexico	09710	IMP	Guadalupe	31414	SB
California City	09780	KER	Hanford	31960	KIN
Cambria	10074	SLO	Healdsburg	33056	SON
Cameron Park	10256	ED	Hollister	34120	SBT
Canyon Lake	10928	RIV	Ione	36672	AMA
Castroville	11978	MON	Kerman	38226	FRE
Chowchilla	13292	MAD	King City	38520	MON
Clearlake	13945	LAK	Kingsburg	38562	FRE
Coalinga	14274	FRE	Lake Elsinore	39486	RIV
Corcoran	16224	KIN	Lakeland Village	39598	RIV
Corning	16322	TEH	Lake Los Angeles	39612	LA
Crestline-Lake Arrowhead	17162	SB	Lamont	40088	KER
Delano	18394	KER	Lathrop	40704	SJ
Desert Hot Springs	18996	RIV	Lemoore	41152	KIN

SMALL URBAN AREA CODES (S) APPENDIX C
POP 5,000 - 49,999

SMALL URBAN NAME	CODE	CO	SMALL URBAN NAME	CODE	CO
Lincoln	41474	PLA	Ridgecrest	60704	KER
Lindsay	41712	TUL	Ripon	61026	SJ
Livingston	42006	MER	Riverbank	61068	STA
Loomis	42140	PLA	Rosamond	62826	KER
Los Banos	44028	MER	San Diego Cntry Estates	66004	SD
McFarland	44826	KER	Sanger	67056	FRE
McKinleyville	44910	HUM	Santa Paula	70042	VEN
Madera	45022	MAD	Sebastapol	70770	SON
Madera Acres	45050	MAD	Selma	70882	FRE
Manteca	45484	SJ	Shafter	71106	KER
Mendota	46828	FRE	Soledad	72520	MON
Morro Bay	49362	SLO	Sonoma-Boyles Ht Sprng	72646	SON
Needles	50734	SBD	South Lake Tahoe	73108	ED
Nipomo	51476	SLO	Susanville	77364	LAS
Oakdale	52694	STA	Taft	77574	KER
Ojai-Mira Monte	53476	VEN	Tehachapi	78092	KER
Orange Grove	54008	FRE	Temecula	78120	KER
Orland	54274	GLE	Tracy	80238	SJ
Orosi	54372	TUL	Tulare	80644	TUL
Oroville-Oroville E-S Oroville-Thermalito	54386	BUT	Turlock	80812	STA
Palermo	55086	BUT	Twentynine Palms	80994	SBD
Paradise-Magalia	55520	BUT	Ukiah	81134	MEN
Parlier	55856	FRE	Wasco	83542	KER
Perris-Sun City	75826	RIV	Wildomar	85446	RIV
Paso Robles	56056	SLO	Willits	85600	MEN
Patterson	56112	STA	Willows	85684	GLE
Petaluma	56784	SON	Winton	86076	MER
Placerville	57540	ED	Woodlake	86300	TUL
Porterville-E Porterville	58240	TUL	Woodland	86328	YOL
Ramona	59346	SD	Yreka	86944	SIS
Red Bluff	59892	TEH	Yucca Valley	87056	SBD
Reedley	60242	FRE			

NAAQS OZONE NON ATTAINMENT AREAS APPENDIX D

NON-ATTAINMENT AREA	NA CODE	URBANIZED AREA	URBANIZED CODE
Bay Area	006	Antioch-Pittsburg	257
		Fairfield	299
		Napa	302
		San Francisco-Oakland	006
		San Jose	032
		Santa Rosa	235
Sacramento Metropolitan	042	Davis	381
		Sacramento	042
		Vacaville	417
San Diego	023	San Diego	023
San Joaquin Valley	080	Bakersfield	114
		Fresno	080
		Lodi	400
		Merced	380
		Modesto	234
		Stockton	119
		Visalia	306
South Coast	002	Hemet - San Jacinto	300
		Los Angeles	002
		Riverside -San Bernardino	048
Southeast Desert	301	Hesperia-Apple Valley	391
		Indio - Coachella	396
		Lancaster - Palmdale	301
		Palm Springs	303
Ventura	224	Oxnard - Ventura	224
		Simi Valley	237
Santa Barbara	187	Santa Barbara	187
		Lompoc	402
		Santa Maria	305

APPENDIX E

Metropolitan Transportation Commission (MTC) **Appendix E**
Conversion of PCI to PSR

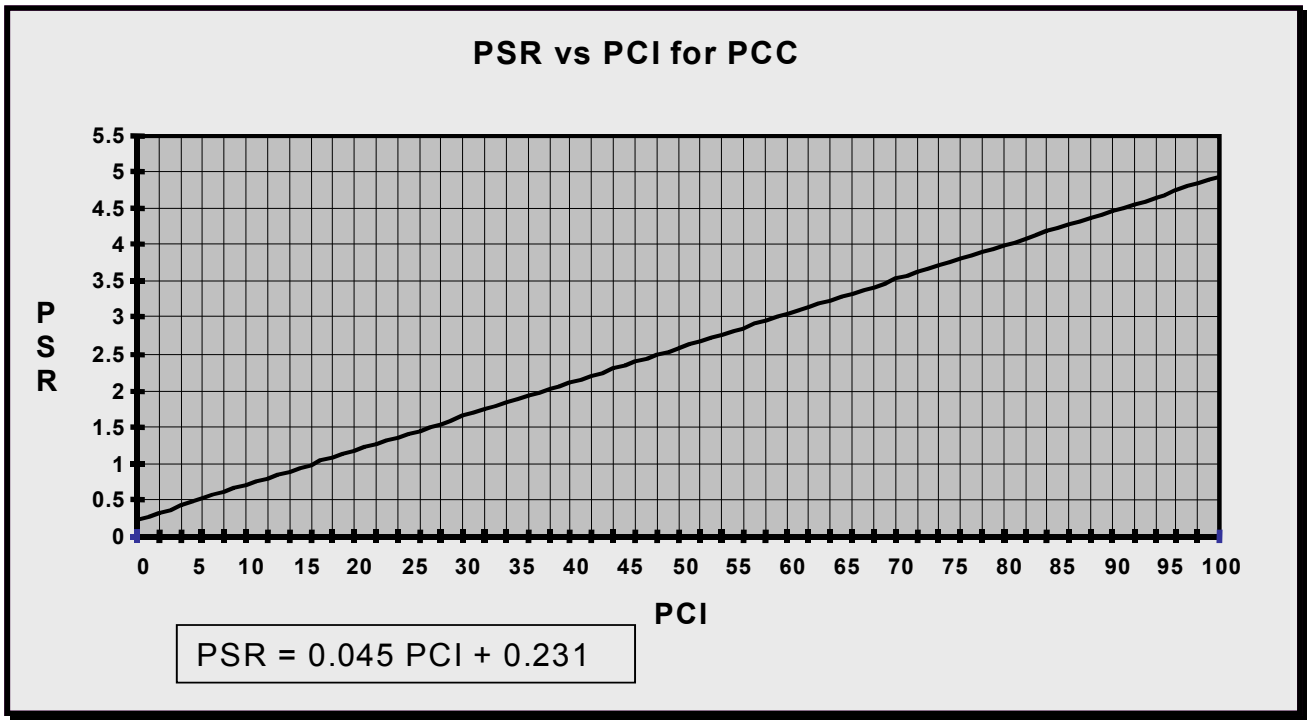


Chart E-1

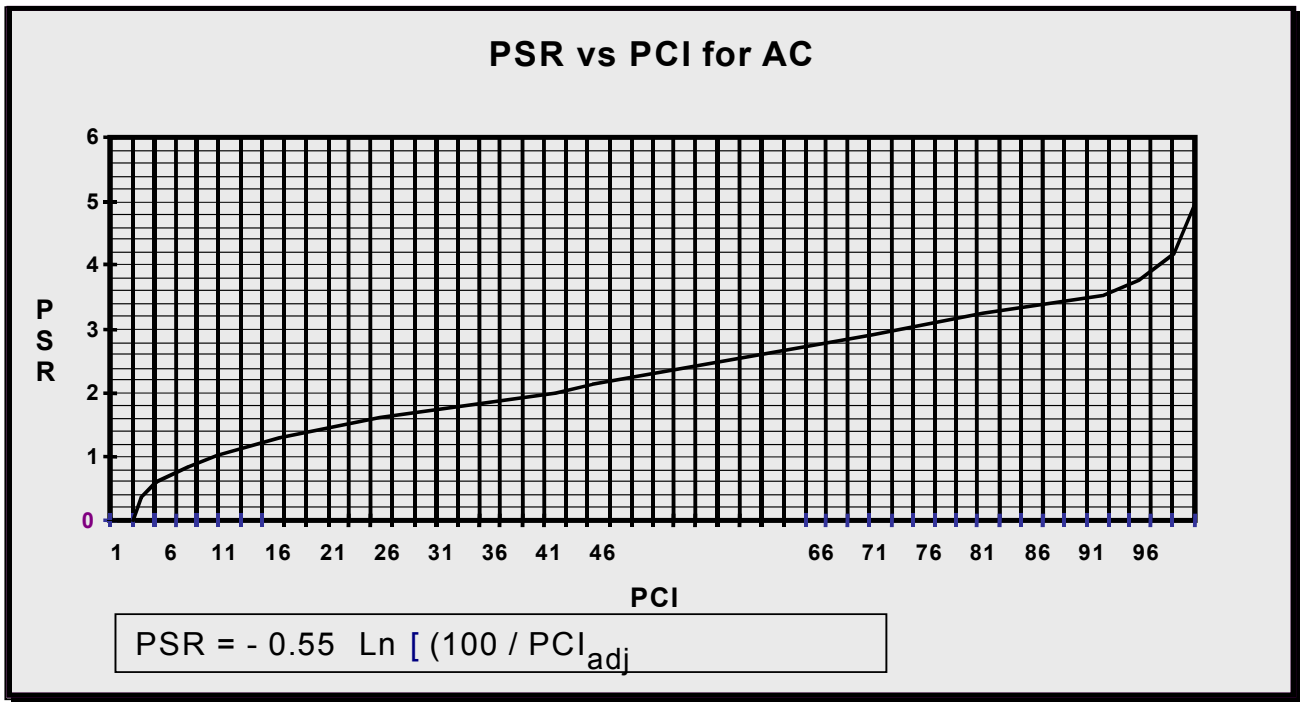


Chart E-2

APPENDIX E
Metropolitan Transportation Commission (MTC) Conversion of PCI to PSR

The following information was taken from a study entitled, *Prediction of Present Serviceability Rating from Pavement Condition Index in the San Francisco Bar Area*, done by Texas A&M University with cooperation from MTC and is included here to assist in the annual HPMS submittal. This methodology is used by MTC and may be of assistance in conversion to a PSR in other jurisdictions. It is not meant to be a Caltrans standard, however, and is included only for your reference.

A review of the Present Serviceability Rating (PSR), Present Serviceability Index (PSI) and Pavement Condition Index (PCI) in the San Francisco Bay Area was completed by Texas A&M University, Texas Transportation Institute. For study purposes, the following definitions were accepted:

PSR	measures riding comfort of a pavement section as experienced subjectively by road users.
PSI	is an indication of the roughness of a pavement section as measured by irregularities in the longitudinal profile.
PCI	is a measure of the quantity and severity of surface distresses.

Results of this study: PSR and PCI data for PCC Pavement sections showed a clear linear trend. The data for AC pavement sections did not show a definite linear trend. After trial and error, many of the discrepancies were overcome with an exponential (or logarithmic) form of equation involving the use of an adjusted PCI. The adjusted PCI was derived from the normal procedure of PCI determination except that all low severity cracking was neglected in the calculation. Low severity cracking affects the PCI but has little effect on the PSR, or riding comfort, for these purposes.

Model for Portland Cement Concrete (PCC) Pavement

Linear regression equation: PSR = 0.047 PCI + 0.231

The regression analysis showed that PSR and PCI for PCC pavements are highly correlated with each other. The best-fit curve has an $R^2 = 0.87$ (which means that the regression equation explains 87% of the variation among the data). *See Chart E-1 on page A-7.*

Model for Asphalt Concrete (AC) Pavement

Regression equation which most closely met the desired criteria:

$$PSR = - 0.55 \, Ln \, [\, (100 / PCI_{adj}) - 1 \,] + 2.17$$

The best-fit curve has an $R^2 = 0.75$ (which means that the regression equation explains 75% of the variation among the data).
See Chart E-2 on page APP-7.

APPENDIX F

AADT ESTIMATION - Guidelines for HPMS Data Collection

Traffic data are the most useful and important transportation data collected for analysis and decision-making. The following guidelines are taken from a document prepared by the California Department of Transportation, Traffic Operations Program, which was compiled to help improve the quality of traffic information reported by local governments in support of the Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS).

A true Annual Average Daily Traffic (AADT) evaluation is the total traffic volume for the year divided by 365. This true AADT figure requires continuous Automatic Traffic Recording (ATR) throughout the year. Anything short of a 365 day continuous count is considered an estimate. Realistically, continuous counting at every location is not cost effective. In practice, the State of California uses regional continuous count stations (trend count stations) to establish patterns on certain roadway types within a large region and it uses these figures to provide the necessary data to evaluate seasonal, recreational, weekly or daily trends.

Based on historical trends, traffic volumes at any given location often vary in a consistent pattern. During a 12 month period there are consistent variations by month, day and hour. Changes occurring in this consistent pattern can usually be attributed to normal growth in traffic volume, seasonal commerce, recreational travel, change in usage of a facility, addition or deletion of a traffic generator, development affecting the site or some other tangible change to the facility. Because of these largely consistent variations, factors can be developed for day of the week, month of the year and seasonal fluctuations for use in estimating AADT. Other factors specific to site location and equipment used for the counts may be useful in developing an AADT estimate.

The following equation can be used to estimate AADT for a specific location:

AADT = Vol x D x S x A x G x E

Where:
- AADT = Annual Average Daily Traffic at a specific location
- Vol = 24-hour axle volume at that location
- D = applicable day-of-week factor
- S = applicable seasonal or monthly factor
- A = applicable axle-correction factor (if needed)
- G = applicable growth factor (if needed)
- E = applicable equipment error (if needed)

Note: The FHWA Traffic Monitoring Guide (TMG) recommended method for adopting 48-hour counts is to convert each of the two separate 24-hour periods to AADT using the above equation and then average. The application of some of the individual factors may be unnecessary; for example, automatic classification equipment that counts vehicles does not require axle correction. If a factor is not required, eliminate it from the equation. The use of statistical average factors will not provide exact results, but the results should balance out on the average due to the many sources of variation.

Vol = Volume This is a short-term (24-hour) traffic count collected for a specific location. A 48-hour traffic count is recommended by FHWA for HPMS purposes, but the 24-hour data may be derived from any count for an extended duration. The short-term count must reflect typical traffic patterns for the location, meaning that holiday and other atypical counts should not be used.

D = Day-of-week factor This factor must be developed from data collected at a "Control Station" site. The data at one of these sites are counted consistently and mimic the weekly traffic pattern for that location. These sites can be called Control Stations since they are able to produce factors controlling the estimated AADT value for other related locations.

AADT ESTIMATION - Guidelines for HPMS Data Collection (continued)

The FHWA Traffic Monitoring Guide (TMG) states that "Data from the continuous ATR program must be used to develop the day-of-week factors".

The daily factors are computed as: $$D = \frac{\text{Monthly Average Daily Traffic (MADT)}}{\text{Monthly Average Day of Week Volume}}$$

EXAMPLE: The January Monday factor is the January MADT divided by the average volume of Mondays in Jan.

The TMG also recommends the use of 7 day-of-week factors for each month of the year. Statistical sampling procedures require that each element in the universe or sampling frame have an equal chance of being selected. Therefore, excluding weekends from the sampling possibilities would bias the procedure.

S = Seasonal or Monthly Factors, also need to be developed from consistent count sites such as Control Stations. The TMG recommends developing 12 individual monthly factors from continuous ATR stations.

The individual monthly factors for each ATR station are computed as: $$S = \frac{\text{AADT (average of all daily counts collected at the site)}}{\text{MADT (average daily counts for a specific month)}}$$

The TMG recommends breaking down monthly factors for all functional classification classes (such as Interstate Rural, Other Rural, Interstate Urban, Other Urban and recreational). Typically, urban area monthly factors vary < 10%, while rural areas fluctuate between 10% and 25%. Values > 25% indicate high variation that may be caused by recreational or other intermittent use, which should be investigated further.

A = Axle Correction Factor adjustments are required for all counts taken by axle counting equipment. TMG considers axle correction factors calculated for functional class to be sufficient. Vehicle detectors, such as classification and weigh-in-motion equipment do not require axle adjustment.

The axle correction factor is the ratio of vehicles to axles as determined from a classification count. If a classification count is not available HPMS recommends collecting 15-minute data manually at the site. This count should be completed within a 48-hour time period to eliminate seasonal or other variations.

The formula for computing the axle correction factor is: $$A = \frac{\text{Number of Vehicles}}{\text{Number of Axles}}$$

The axle correction factor generally ranges from 0.2 to 0.5. An axle correction factor should be applied in most instances as some devices automatically divide the axle impulses by two to record vehicles. This method is sufficient only if all vehicles counted on the section contain 2 axles or less.

G = Growth Factors can be estimated from consistent count sites such as Control Stations if the yearly differences can be attributed to growth. Many conditions affect these differences so this is not always realistic. Growth factors can also be developed on a system wide basis. HPMS standard sample sections record AADT estimates annually and should provide point-specific growth ratios from year to year. These growth factors would be more precise if a complete 3-year cycle of counts was used, but rough estimates may be derived from single year counts along with earlier or historic AADT estimates.

The formula for annual growth factor at a single location is: $$G = \frac{\text{Number of Vehicles}}{\text{Number of Axles}}$$

TMG recommends developing factors for the different functional classes to use in the computation of AADT for sections not counted during the current year. Growth factors should always be developed from AADT estimates rather than raw count data.

AADT ESTIMATION - Guidelines for HPMS Data Collection (continued)

E = Equipment Errors Data collection equipment, as any equipment, is subject to malfunction. This may result in continuous over/under counting. Equipment should be periodically compared with manual counting (short periods) or with verified accurate equipment (longer periods) to reduce possibility of this type of error.

The percent difference between manual and machine counts can be calculated as follows:

$$E = \frac{(\text{Machine volume} - \text{visual volume})}{\text{Visual volume} \times 100}$$

This percent difference can then be applied to all counts generated by this equipment until the equipment can be mechanically repaired.

Directional distribution of traffic may also indicate machine malfunction. In most instances, morning and evening peaks will occur in opposite directions. For highly uneven directional distribution, a pattern may be established and possibly confirmed with earlier traffic counts at the same or similar sites. Recreational area arrival and departure travel patterns as well as service road or other access point locations may also lead to uneven traffic splits. Uneven patterns should be investigated further.

Other Error-Producing Contributing Factors

Traffic flow or Machine errors. Correctly functioning counters on highly populated multilane facilities may generate machine errors if several vehicles trip the counter at the same time or when road surfaces are severely deteriorated. Repositioning sensors, changing locations, etc may achieve more accurate counts on these facilities. Other possible machine errors are sensor dropout between truck and trailer causing two vehicles instead of one to be counted, vehicles changing lanes at loops or straddling the centerline, or lane reconfiguration due to construction restriping. If data changes suddenly it should be investigated.

Manual counts or portable automatic vehicle classification (AVC) equipment can be used to test for traffic volume machine error. Lane specific AVC equipment has proven to be accurate for total volume classification. Manual classification counts to confirm performance of AVC equipment can have a human error factor of as little as one percent, depending on observer experience, length of count and traffic volume.

Error by Traffic speed: Road tube counters seem to generate more traffic speed errors than loop detection equipment. At higher speeds, road tube counters may miss the second axle due to displacement of air in the tube not allowing the air switch to normalize before the next axle impact. It is best not to use data that have been collected with missed time periods or with serious malfunctions.

Long segments: The standard method used to compute traffic for a long segment with varying traffic volumes is to figure a *weighted average* for the entire length.

A weighted average can be computed as follows:

$$\text{Weighted Average} = \frac{(\text{segment-1 traffic} \times \text{segment-1 length}) + (\text{segment-2 traffic} \times \text{segment-2 length}) + (\text{segment-3 traffic} = \times \text{segment-3 length})}{\text{total segment length}}$$

Rounding: AADT figures are calculated using various factors. Traffic conditions will vary from day to day. To avoid a false sense of precision, which might incorrectly indicate there is an exact number of vehicles on the roadway, final AADT figures should be rounded after all factors have been applied to the base data.

The recommended rounding convention for volume of vehicles is found in the table at the right:

Volume	Round to nearest
0 – 999	10
1,000 – 9,999	100
10,000 plus	1,000

APPENDIX G
STANDARDIZED COMMON ABBREVIATIONS

Due to the vastness of our database and the number of different people working in it, we would like to share these standardized terms with you for input into the "Road or Street Name" and "FROM" and "TO" Descriptions. These terms are not new, but over the years we have gotten away from them. Standardizing these terms throughout the database will make it easier for everyone to understand and extract data.

EXISTING TERMS	PREFERRED	EXISTING TERMS	PREFERRED
Interstate Rte 5	I-5	Wyndham Lane	Wyndham Ln
Interstate 5	I-5	Blue Lake Blvd	Blue Lk Blvd
I - 5	I-5	Iron Mountain Rd	Iron Mtn Rd
Jct State Rte 299	SHWY 299	Montgomery Creek Rd	Montgomery Crk Rd
Jct Route 299/89	SHWY 299 (or SHWY 89)	Montgomery Cr Rd	Montgomery Crk Rd
SHWY Rte 299	SHWY 299	Clear Creek Rd	Clear Crk Rd
SH Rte 299	SHWY 299	Clear River	Clear Riv
Eureka St - SHWY 299	Eureka St (SHWY 299)	Creek Canyon Road	Creek Cyn Rd
Eureka St (SHWY 299)	Eureka St (SHWY 299)	Creek Valley Road	Creek Vly Rd
SHWY 299 Eureka St	Eureka St (SHWY 299)	Creek Road	Creek Rd
Montgomery St SHWY299	Montgomery S(SH 299)	Old Oregon Trail	Old Oregon Tr
Buenaventura Av/Rte 299	Buenaventura (SH299)	Utah Trail	Utah Tr
Old State Hwy 99 West	Old SHWY 99W	Tehama County Line	Teh Co Ln
Old SHWY 99 W	Old SHWY 99W	Tehama Co Line	Teh Co Ln
County Road 306	Rd 306	Tehama Co Ln	Teh Co Ln
Co Rd 306	Rd 306	East of Main Street	.07M E/Main St
Co Rd 306 (unconstr)	Rd 306 (UNC)	1/2 Mi North of Main	.5M N/Main St
Co Rd 306 extension	Rd 306 (UNC)	City Limit	CL .31M E/Lake St
MM Road	Rd MM	Redding City Limit	CL .31M E/Lake St
6th Street	6th St	CL 1650' E of Lake St	CL .31M E/Lake St
Sixth St	6th St	Urban Limit E/Shasta	URL .15M E/Shasta St
H Street Parkway	H St Pkwy	Redding Urban Limit (or RDG Urb Limit)	URL .15M E/Shasta St
Lake Boulevard	Lake Blvd	Urban/Rural limit (or Rur/Urb Line)	URL .15M E/Shasta St
Black Marble Way	Black Marble Wy	Urb Ln 800 ft E/Shasta	URL .15M E/Shasta St

Appendix H HPMS DATA SURVEY

The Highway Performance Monitoring System (HPMS) is an information system that addresses all the State's public road mileage. It is a highway transportation database and analytical simulation system than can serve a variety of users and uses. A major purpose of HPMS is to measure and monitor the condition, performance, usage, and operating characteristics of State and Non-State highways for use by policy decision-makers and Congress in developing and evaluation Federal-aid highway programs and TEA-21 funding levels.

The HPMS database is part of the Caltrans Corporate Database or Transportation System Network (TSN). The HPMS Branch is part of the Planning Core's Division of Transportation System Information. This survey was developed to help assess the data needs of our current and potential data users.

Please check:

1. Have you used HPMS data in the past? Yes _____ No _____ Not Sure _____

   If yes, please specify type of data used: _____
   _____
   _____

2. The HPMS provides State-owned and non-state highway data on the following items, please check all data items you use or may use in the future. Also, please check if you want more information from our office.

	Use Now	May Use In The Future	Need More Information
Annual Average Daily Traffic (AADT)	_____	_____	_____
Capacity (based on FHWA Capacity Manual)	_____	_____	_____
Federal Roadway Functional Classifications	_____	_____	_____
International Roughness Index (IRI) – Pavement Condition	_____	_____	_____
National Highway System (NHS)	_____	_____	_____
Number of Lane Miles	_____	_____	_____
Percent Commercial Vehicles – Peak/Non-Peak	_____	_____	_____
Posted Speed Limit	_____	_____	_____
Present Serviceability Rating (PSR) – Pavement Condition	_____	_____	_____
Vehicle Miles Travel (VMT)	_____	_____	_____

3. In addition to those items checked above, please specify particular data you'd like to have:
   _____
   _____

4. Other questions or comments on the HPMS Program:
   _____
   _____

Please tell us whom we can contact regarding this survey:

Name: _____ Phone No. _____

District / Program: _____ E-mail: _____

Thank you for taking the time to complete this survey. Please mail to:
Caltrans, Division of Transportation System Information – HPMS – MS-38, P.O. Box 942874, Sacramento, CA 94274-0001

ABOUT FUNCTIONAL SYSTEMS APPENDIX I

The functional systems required by Title 23, U.S.C. legislation, have been chosen as the most logical, stable base for the HPMS (23 CFR 470). The FHWA functional system is a key data item in all HPMS records. Functionally classifying public streets and highways groups them into systems according to the services they provide.

IT IS IMPORTANT TO NOTE HERE THAT FUNCTIONAL CLASSIFICATION CANNOT BE CHANGED THROUGH THE MAINTAINED MILEAGE OR THE HPMS SUBMITTAL, BUT MUST BE OFFICIALLY RECOGNIZED BY FHWA. THE PROCESS BEGINS WITH SUBMITTAL OF CHANGES TO CALTRANS' OFFICE OF HIGHWAY SYSTEM ENGINEERING THROUGH CALTRANS' DISTRICT SYSTEM PLANNING CONTACTS.

PRINCIPAL ARTERIALS (PA)

RURAL: A road classified as Principal Arterial (PA) serves corridor movements having trip length and travel density characteristics of statewide or interstate travel. A PA Rural route provides an integrated network without stub connections except under certain conditions such coastal city or international boundary connections.

URBAN: A PA Urban route carries the major portion of trips entering and leaving urban areas as well as the majority of through movements bypassing the central city. PA serves intra-area travel (such as between major inner-city communities, between central business districts and residential areas or between major suburban centers).

MINOR ARTERIALS (MA)

RURAL: Rural MA roads link cities, larger towns and other important traffic generators such as resort areas into an integrated network of arterial highways. This network provides intrastate and inter-county service connecting to rural collector or local roads.

URBAN: Urban MA streets and roads interconnect and expand the PA system and provide service for moderate distance and lower mobility travel. The MA system distributes travel to smaller geographic areas than the PA system. The Urban MA system may carry local bus routes and provide intra-community continuity but does not penetrate neighborhoods.

COLLECTORS

RURAL: Rural Collector routes generally serve travel of primarily intra-county importance rather than statewide importance. Predominant travel distances are shorter than on Arterial routes.

RURAL MAJOR COLLECTORS (MJC): Rural MJC routes provide service to county seats and larger towns not served by Arterials. Rural MJC routes also link other important intra-county traffic generators such as consolidated schools, shipping points, county parks and important mining and agricultural areas.

RURAL MINOR COLLECTORS (MNC): Rural MNC routes serve the more important intra-county corridors and developed areas within a reasonable distance of a major collector road. Rural MNC routes also link the locally important traffic generators in the rural areas.

URBAN COLLECTORS (COL): Urban COL routes provide land access service and traffic

FUNCTIONAL SYSTEMS & POPULATION GROUPS (CONTINUED) APPENDIX I

LOCAL STREETS AND ROADS

Local Streets and Roads are technically not functionally classified.

RURAL LOCAL (LOC): Rural LOC routes provide access to adjacent land and provide service to short distance travel.

URBAN LOCAL (LOC): Urban LOC routes provide access to neighboring land or to functionally classified routes. These routes offer the lowest level of mobility and usually contain no bus routes. Through traffic movement is usually discouraged.

RURAL		URBAN	
Principal Arterial Interstate	(PAI)	Principal Arterial Interstate	(PAI)
Other Principal Arterial	(OPA)	Principal Aterial - Other FWY / EXP	(OFE)
Minor Arterial	(MA)	Other Principal Arterial	(OPA)
Major Collector	(MUC)	Minor Arterial	(MA)
Minor Collector	(MNC)	Collector	(COL)
Local	(LOC)	Local	(LOC)

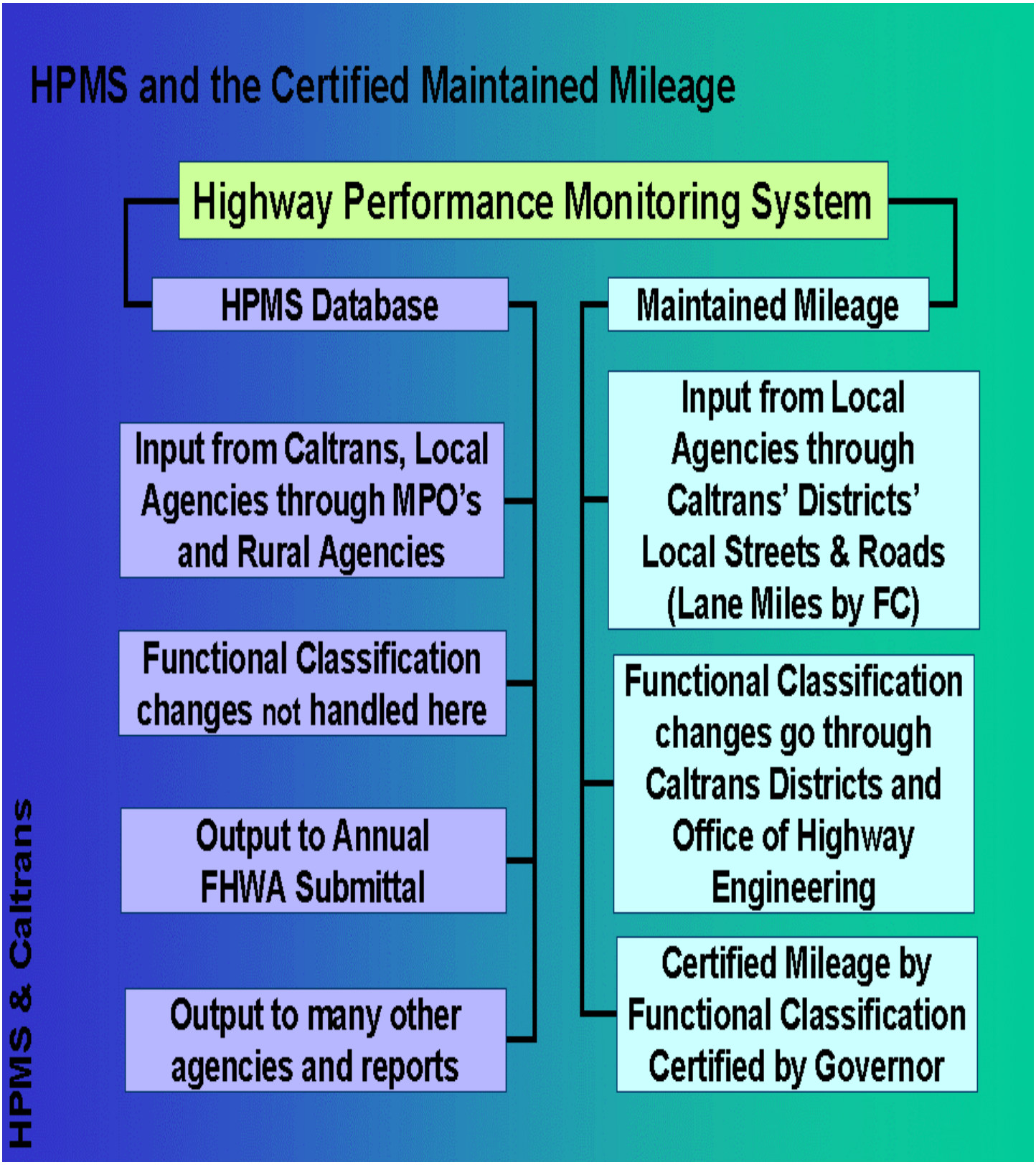
POPULATION GROUPS

The United States Bureau of Census divides communities into groups by volume of population. These groupings are used for further analysis by many agencies such as the Environmental Protection Agency (EPA) and are an important part of HPMS data items and analysis.

RURAL (R) AREAS are those areas outside the boundaries of small urban and urbanized areas. The Bureau of Census defines rural areas as having a population of less than 5,000.

SMALL URBAN (S) areas are defined by the Bureau of Census as having a population of 5,000 to 49,999.

URBANIZED (U) areas are defined as having a population of 50,000 to 199,999.


HPMS and the Certified Maintained Mileage
Highway Performance Monitoring System
HPMS Database
Maintained Mileage
Input from Caltrans, Local Agencies through MPO's and Rural Agencies
Functional Classification changes not handled here
Output to Annual FHWA Submittal
Output to many other agencies and reports
Input from Local Agencies through Caltrans' Districts' Local Streets & Roads (Lane Miles by FC)
Functional Classification changes go through Caltrans Districts and Office of Highway Engineering
Certified Mileage by Functional Classification Certified by Governor
HPMS & Caltrans

HPMS DATA ITEMS

UNIVERSE ITEMS

1	Data Year	17	Functional System	33	AADT (PA,NHS,Samp)
2	State Code	18	Func Sys Code (generated)	34	No of Through Lanes
3	English/Metric Units	19	NHS	35	IRI (Roughness Index)
4	Co FIPS Code	20	Planned / Unbuilt	36	PSR (Condition)
5	Section ID	21	Interstate Route No	37	HOV OPS
6	Standard Sample	22	Route Signing		**HIGHWAY SURVEILLANCE**
7	Donut Sample	23	Rte Sign Qualifier	38	Hwy Surv - Electronic
8	State Control	24	Signed Route No	39	Hwy Surv - Metered ramp
9	Grouped Section	25	Government Ownership	40	Hwy Surv - Var message sign
10	LRS Section ID	26	Spec Sys (STRAHNET)	41	Hwy Surv - Hwy advisory radio
11	LRS Begin Point	27	Type of Facility	42	Hwy Surv - Surveillance cameras
12	LRS Ending Point	28	Designated Truck Rte	43	Hwy Surv - Incident detection
13	Rural/Urban Desig	29	Toll facility	44	Hwy Surv - Free cell phone
14	Sampling Technique	30	Section Length	45	Hwy Surv - Service patrol
15	Urbanized Area Code	31	Donut Volume Group	46	Hwy Surv - In-vehicle sign
16	NAAQS Code	32	Sample Volume Group		

STANDARD SAMPLE ITEMS

47	Sample ID	65	Length of Curves-Class C	81	%Single Trucks - Peak Travel
48	Donut Expansion Factor	66	Length of Curves-Class D	82	% Single Trucks - Average Travel
49	Sample Expansion Factor	67	Length of Curves-Class E	83	%Combo Trucks - Peak Travel
50	Surface Pavement Type	68	Length of Curves-Class F	84	%Combo Trucks - Average Travel
51	SN or D	69	Horiz Alignment Adequacy	85	K Factor (Design Hour Volume)
52	Climate Zone	70	Terrain Type (rural)	86	D Factor (Directional Factor)
53	Yr. of Surface Improvement	71	Vert Alignment Adequacy	87	No of Lanes in Peak Hour Dir
54	Lane Width	72	Length of Grades-Class A	88	Turning Lanes / Bays (left)
55	Access Control	73	Length of Grades-Class B	89	Turning Lanes / Bays (right)
56	Median Type	74	Length of Grades-Class C	90	Type of Signals
57	Median Width	75	Length of Grades-Class D	91	% Green Time (signals)
58	Shoulder Type	76	Length of Grades-Class E	92	No of At-Grade Signals
59	Shoulder Width (RT)	77	Length of Grades-Class F	93	No of At-Grade Stops
60	Shoulder Width (LT)	78	Passing St Distance (rural)	94	No of At-Grade Others
61	Peak Parking (urban)	79	Weighted Design Speed	95	Peak Capacity
62	Widening Feasibility	80	Posted Speed Limit	96	Volume / Service Flow Ratio
63	Length of Curves-Class A			97	Future AADT
64	Length of Curves-Class B			98	Future AADT Year

Items highlighted in yellow are those we are requesting updates on this year.